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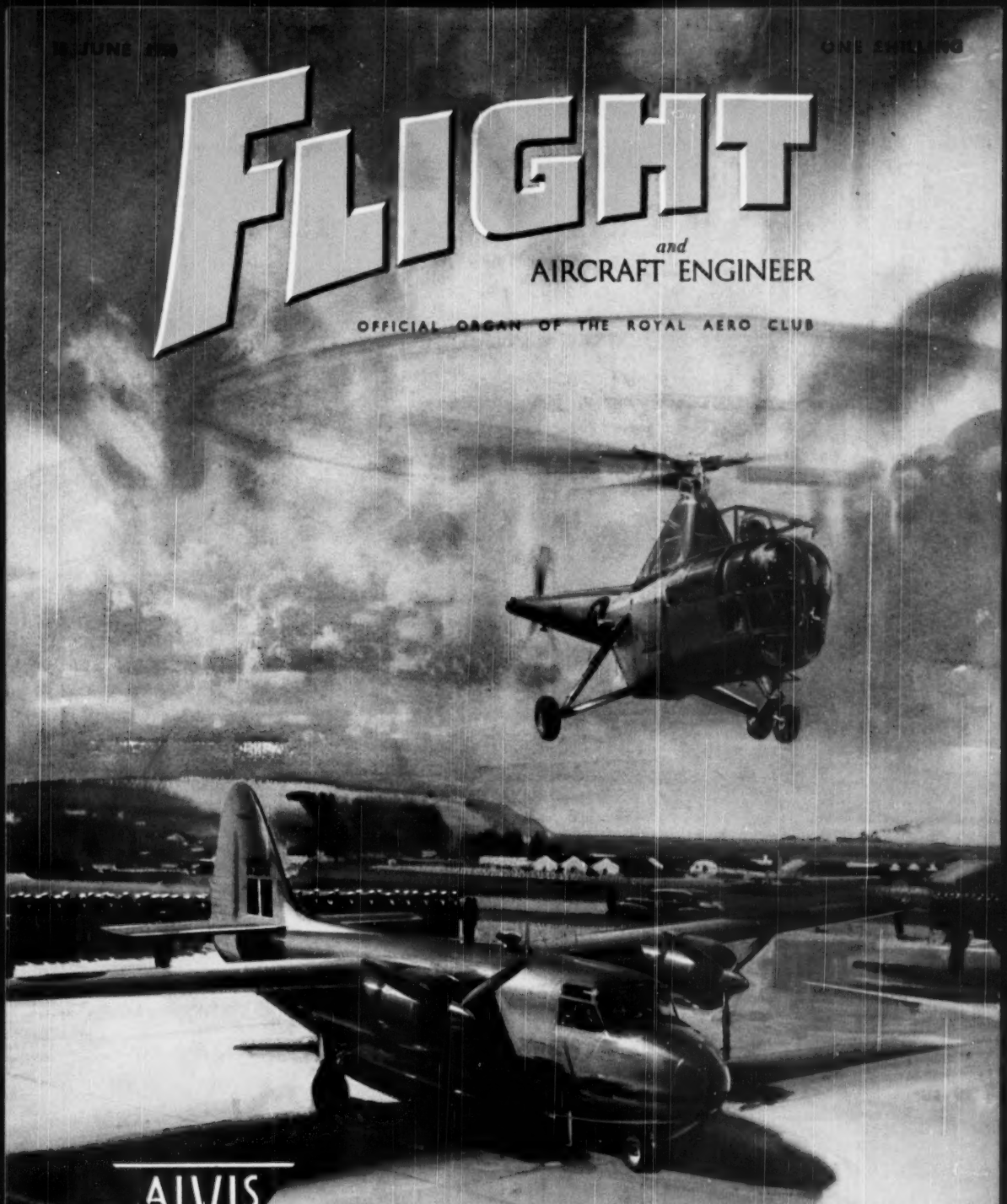

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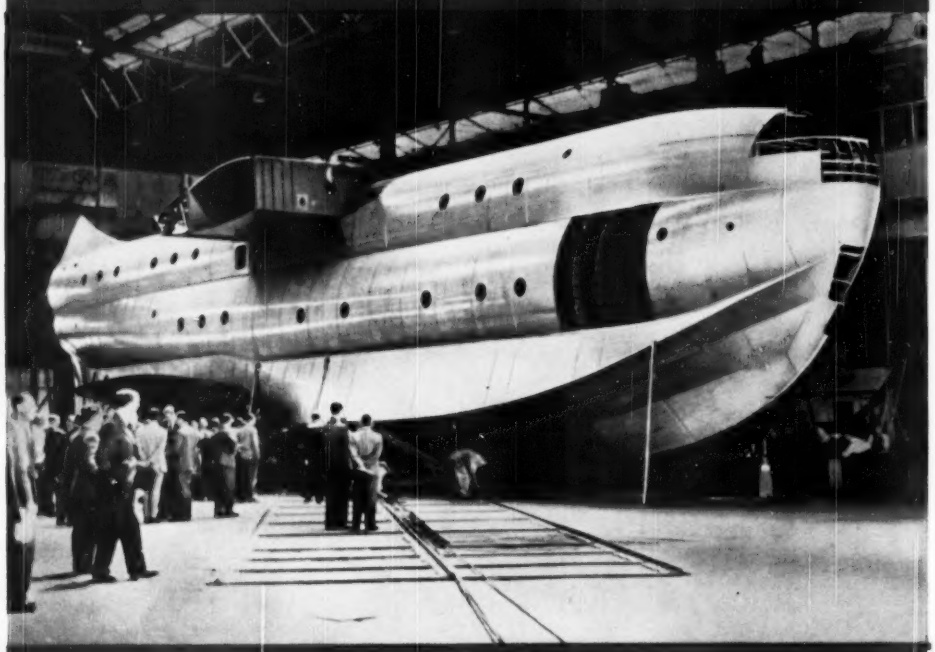

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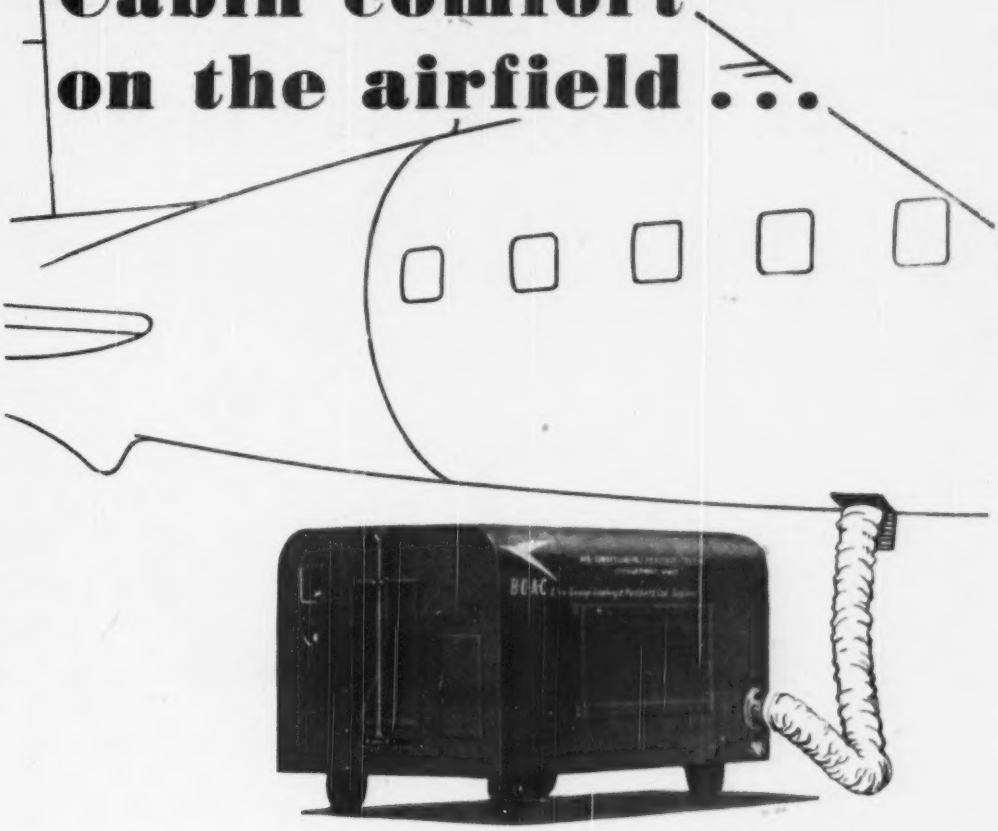

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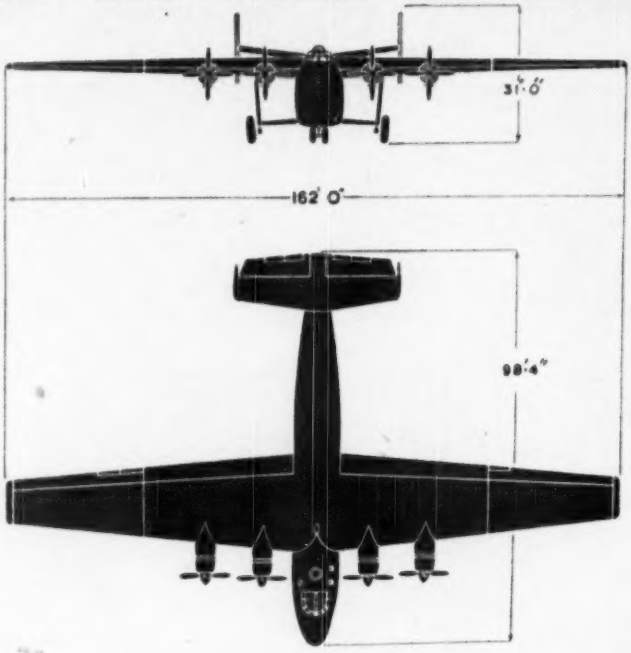

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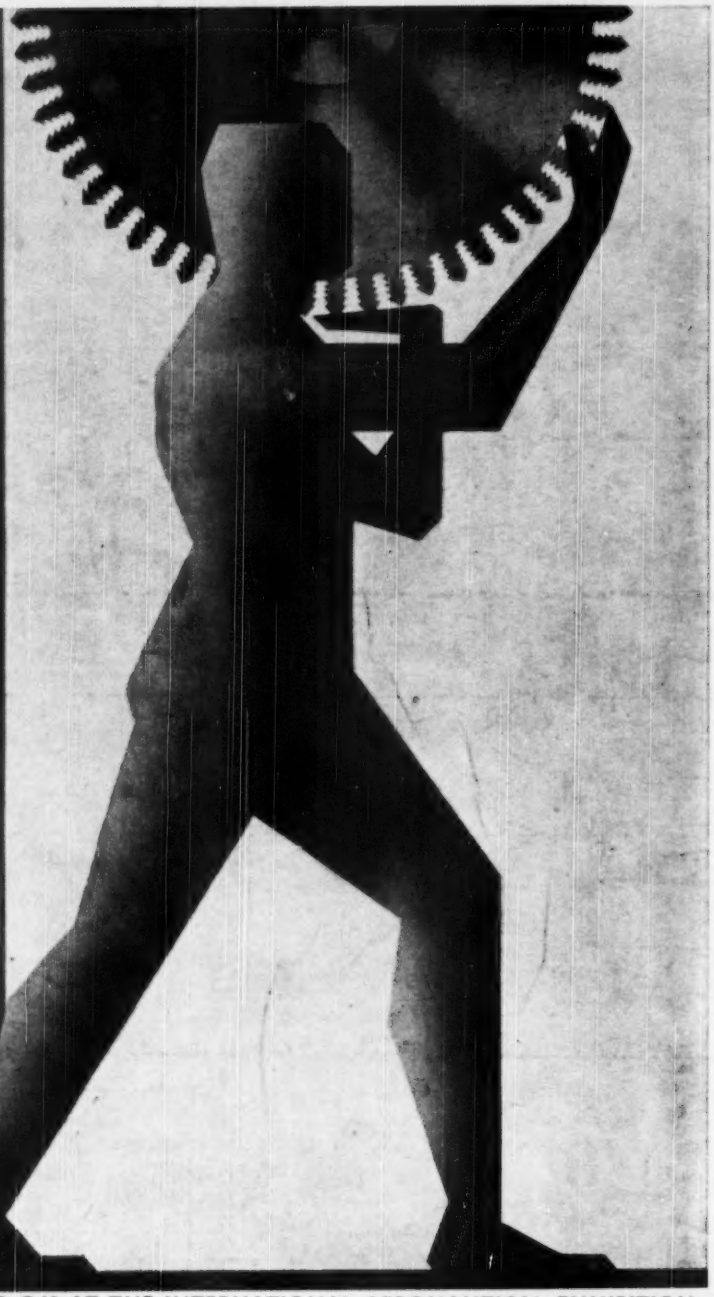

EXHIBITING ON STAND G.10 AT THE INTERNATIONAL AERONAUTICAL EXHIBITION, BRUSSELS, JUNE 10th-25th, 1950

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Imagine an island . . .

It is roughly 500 miles square and has two towns, both populated by executives and employees of mining and trading companies. There are no railways and few roads. The interior, where large mineral deposits are situated, is rocky and well wooded, with a number of lakes and rivers. It lies off the trunk air routes and has to be served by feeder airline to the mainland.

Shorts have designed the Sealand for all areas in which the conditions of this island are repeated, and similar enterprises are considered.

The Sealand has proved itself a thoroughly economical proposition, for it carries 8 passengers, or 6 passengers with their baggage and 80 lb. of freight, to and from the island, travelling over 300-mile stretches of sea at an average speed of 127 m.p.h.

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Private companies, with extensive interests in the agricultural and fishing industries of the island, find the Sealand incomparable for accelerating the development of their enterprises; where fleets of trawlers are operating they are easily controlled from the air while at sea.

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It is for islands such as this one that British West Indian Airways have adopted the Short Sealand on their Sea-Island Service which links the scattered islands of the Caribbean.

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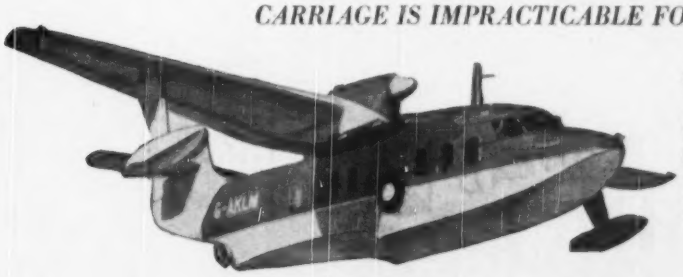

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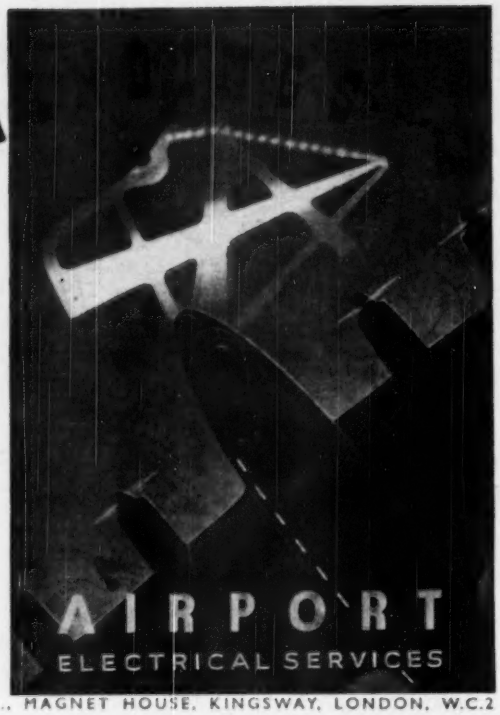

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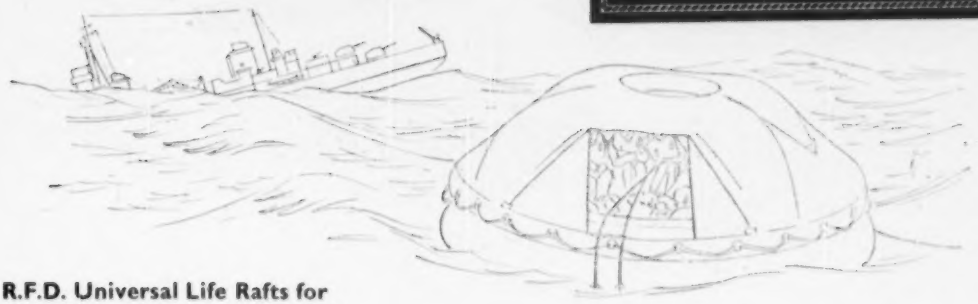

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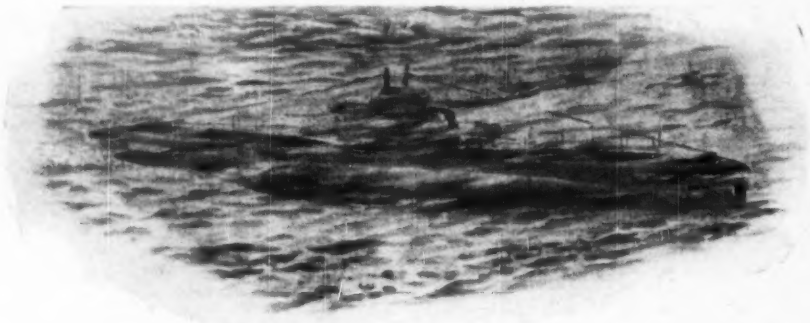

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FLIGHT
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AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2164 Vol. LVII. THURSDAY, 15 JUNE 1950

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Telegrams : Flightpress, Sedist, London.
Telephone : Waterloo 3333 (60 lines).

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Aeronautical Stage-Management

EVEN better than the demonstration pilot who, though he may visit dozens of flying displays in a season; is primarily concerned with his own aircraft, the aeronautical journalist is in a position to judge the merits (and occasional demerits) of such affairs. Perhaps, therefore, we may make some observations on the subject—not so much as a result of attendance at events of the last few week-ends, but from impressions gained over a good many years.

Some displays seem to have an air of uncertainty as to what they are trying to be. The first thing an organizer should ask himself is whether he is putting on a show primarily for visiting pilots and other *cognoscenti*, or whether he is out to "thrill the million," either to advertise his flying club or to raise funds for some deserving cause. If a select audience is invited his task is easy, because he knows its tastes, though if he also admits a paying public he should play fair with them and not put out any misleading publicity. If, on the other hand, he is after a big crowd and has a conscientious desire to give it its money's worth, he has set himself a far more difficult task. Though it can be done, to try to steer a middle course is the most difficult of all, for it will be found that Mr. and Mrs. John Citizen are singularly unresponsive to the finer points of, say, a spot-landing competition.

With a big public attendance nothing—save fine weather—is more essential than a varied and well-balanced programme and a good commentator who, without being patronizing or facetious, can direct the attention of the crowd to some of the finer points and hold their attention. Siting of the loudspeakers upwind of the crowd is desirable, and, if the airfield geography permits, the spectators should not be expected to stare into the sun. Car-parking, catering and all such services are best placed in the hands of specialists, or at least made the subject of expert advice.

The Flying Programme

When all is said and done, however, the flying programme itself is the ultimate test of success. A "circus" fly-past of varied aircraft types, both participating and visiting, is often an effective overture. Particularly when Service support from distant stations is forthcoming, precise timing of items is essential. As in a circus, too, the aim should be never to leave the arena empty: as one performer leaves it the next must be entering. Demonstrations should be short, leaving the spectator wishing for a little more rather than a little less. Pilots should be briefed to line-up their flying in front of the enclosures and reminded not to vanish in the distance whilst re-aligning themselves (we have seen a 120-m.p.h. light aircraft use up nearly as much sky as a Vampire in the same programme). Items performed partly on the ground, like the hardy annual of the tramp stealing the unattended aircraft, should not be attempted if the crowd perimeter is so long that the far ends can see nothing. Classics like the instructor-and-pupil act must be done superbly well.

On the question of safety, some things that look risky, but are not, are perfectly permissible in a programme designed to thrill; others—e.g., certain manœuvres in aircraft not meant for them—are risky, but cannot be appreciated as such by the layman and are therefore pointless. Low flying or beating-up across (or, more particularly, *along*) the enclosures should be absolutely prohibited; otherwise, it is only a question of time before something happens which, with the help of the newspapers, will put aviation back several years.

The public, of course, delight in a close-up view of any aircraft and its pilot, so there is much to be said for letting machines taxi along in front of the enclosures. Similarly, if helpers are available to stop children playing see-saw on elevators, an opportunity to inspect aircraft at close quarters is always popular. At R.A.F. "at homes," on occasions, an ancient aircraft has been put entirely at the disposal of small boys, with overwhelming success.

We recognize that in offering these constructive criticisms we may have over-simplified the case; but club secretaries and others have the freedom of our Correspondence columns if they wish to differ, concur, or advance their own suggestions.

CONTINENTAL WEEK-END

Paris Sees a Big Flying Display and Brussels the Opening of Its International Aeronautical Exhibition

Illustrated by "Flight" Photographs

General view of the Grand Palais du Centenaire, Brussels. Over 30 British manufacturers are represented in the current *Salon International Aeronautique*, the opening of which is reported on the opposite page.

LAST week-end the focus of aviation interest moved temporarily to the Continent, where two major events, the Orly display and the opening of the Brussels Show, took place. A report on the former event, and a brief preliminary review of the latter, follow in these pages.

Brilliant weather and an excellent flying programme combined to make the French Fête Nationale de l'Air, held on Sunday at Orly Airport, Paris, a shining success. The nine-hour display was organized by the French Public Works, Transport and Tourist Ministries.

The departure of an Air-France Constellation, bound for Buenos Aires, was the first take-off on the programme; it signified a temporary suspension of airline operations.

Shortly afterwards arrived a gaggle of high-performance sailplanes, produced by the Arsenal, Breguet, Fouga, Air and Nord concerns, and towed to the meeting by Gnome-Rhone powered Fieseler Storchs. Each sailplane was demonstrated with a liveliness which expressed well the enterprising spirit of the French national gliding movement. There was also a short succession of displays by light powered machines—attractively grouped under the class-term *tourisme*—of which the most interesting was the pencil-winged Hurel Dubois H.D.10.

The interval remaining before lunch was filled by an exposition of aerial rescue work. First came a parachute-jumping display by a medical-aid team—both men and women—who descended from a Ju.52, and this was followed by practical demonstration of the Hiller 360's rescue capabilities. Another type of helicopter present was the Bell 47D employed to assist the police in crowd-control.

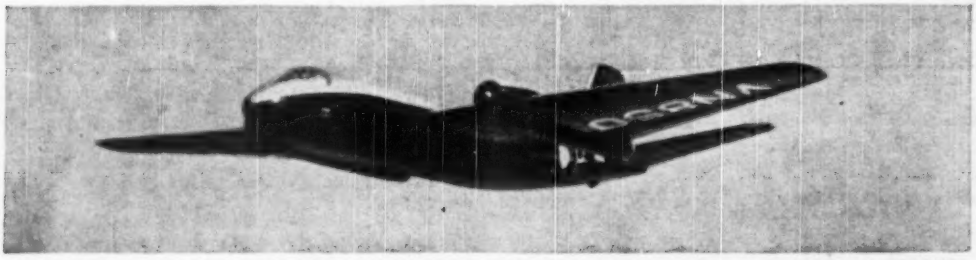
Seven Gloster Meteor 4s of the Belgian Air Force opened the afternoon's flying. They performed in two vics—one of which made straight and level flights past in the intervals between excellent formation aerobatics by the second —plus a dashing individualist, whose very fast, very low runway-skimming was greatly admired.

Although—or perhaps because—the competing aircraft were identical (six four-seat Nord Norecrins) the Grand Prix de la Ville de Paris, for the Louis Hirschauer Cup and 500,000 francs, was a tense and closely contested speed event. The aircraft were never out of sight and chased each other noisily round the field for a total distance of 100 km. At least one Norecrin flew between two hangars, and tight, low pylon-turning, appeared "dicey" at times.

Attractive in its Air France colours, the shapely S.E.2010 Armagnac 80-passenger airliner—France's largest aircraft flying—put in a stately appearance, and national pride was further stimulated by the Languedoc-Leduc "composite," which took off for a steady, low-level run past the enclosures. The ramjet-powered little research machine, mounted pick-a-back on the airliner, could not be released at sufficiently low altitude for individual demonstration.

Certainly the most original performance of the meeting, and one likely to be prominent at future displays, was the Helicopter Ballet, featuring three Hiller 360s. At the command of M. Serge Lifar, these sprightly little machines pirouetted daintily. Although musical accompaniment was provided, their movements, one felt, were more reminiscent of circus performance than ballet.

America's official contribution to the display consisted of two formations of F-80 Shooting Stars of the 36th Fighter Group, based in Germany. Air drill by four machines of the 53rd Squadron supplemented a magnificent aerobatic performance by the 22nd Squadron's "Skyblazers" team, led by Capt. Gordon. A dramatic entry by all eight F.80s was followed by a sustained show, including loops and rolls, in diamond and line astern formation, and neatly completed by a peel-off and stream landing.



W.C. Roland Beamont introduces the Canberra at Orly, where the British jet bomber was seen by a crowd estimated at 500,000.

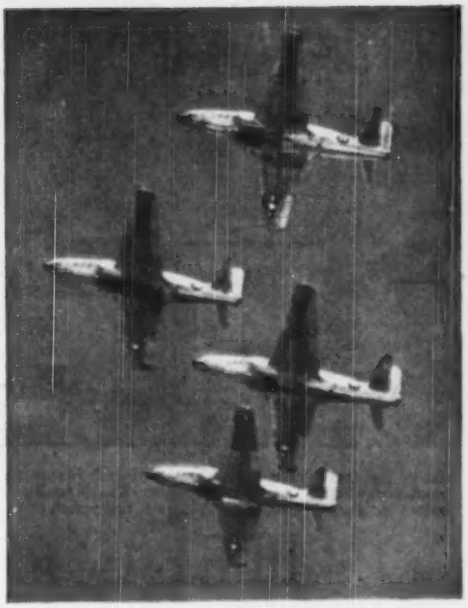
From the rear loading doors of the newly landed Breguet 761 double-deck cargo machine now emerged a small car, the first prize in a lottery held during the display.

Three French jets next appeared: the S.O. Triton, the hump-backed two-seat jet trainer; the S.O. M.1 research machine; and the S.O. 6020 Espadon fighter. Of this Nene-powered trio, the S.O. M.1 impressed with straight-and-level speed runs at a genuine 600 m.p.h., but demonstration generally was disappointing. Of the French fighter prototypes, the Dassault 450 Ouragan is nearest to the squadron-service stage, and the promise shown by its sturdy, practicable lines is lacked by several other types. Three Ourogans, a *patrouille* led by the renowned Col. Rozanoff, took the air at Orly.

Next presented were the Packet-like Nord 2500 twin-boom military freighter, seen to perform well on only one of its two 1,600 h.p. Gnome Rhone radials, and the now familiar Fouga Sylphe. With its Piméné turbojet whistling pleasantly like a kettle, the lively Sylphe well lived up to its new name.

The three following events were a source of pride to the few Britons present at Orly, whose numbers included Mr. Aidan Crawley, the Under-Secretary of State for Air. Parachutist Bernard Lynch was ejected in fine style from a two-seat Meteor—an old camouflaged Mk. 3 converted for the purpose. Spectators were deeply impressed by his demonstration of the Martin-Baker seat under ideal conditions; as Lynch and his chair floated separately to earth a hush had fallen over the crowd. Suddenly, from the loud-speakers, came an excited cry—"*Voici Canberra!*"—coinciding with a fleeting glimpse of the magnificent English Electric bomber, immaculate in working dress of glossy grey and black, as it sped low over the field. The thundrous surge of sound from its two Avons had scarcely abated before the Canberra about-turned to complete the same repertoire of speed-plus-manœuvrability which "English-electrified" the Farnborough audience last September. The pilot, Roland Beamont, made a final dummy approach and landing before departing.

Four instructors of the Operational Conversion Unit at Stradishall, flying Meteor 4s, and led by F./L. R. E. Windle, A.F.C., raised British prestige further with the splendid standard of their air drill and aerobatics. Keeping perfect station, they executed a stall turn and roll-off-the-top which greatly impressed the most critical of many aerobatic exponents who were present.



Aerobatics by F-80 Shooting Stars of the 36th Fighter Group, U.S.A.F., were an outstanding event at Orly.

The tempo of the meeting showed no signs of flagging towards the end but, on the contrary, concluded on a particularly resounding note. Following the—as ever—brilliant performance of Commandant Perrier's Patrouille d'Etampes, 36 Vampires of the French Air Force performed in one formation—largest of its kind seen in France—and 150 paratroops made a mass descent on the airfield.

THE BRUSSELS SHOW

MOST appropriately, the Brussels Salon International Aeronautique is again staged in the fine, modern Grand Palais du Centenaire—appropriately because the theme this year is half a century of aviation development.

Last Saturday morning a Guard of Honour from the Belgian Air Force waited in the bright sunshine for the arrival of the President and his party of ministers and high-ranking officers to mark the official opening and carry out a personal inspection of the stands. National anthems were played by the smart Air Force band, which struck up in the Hall as the President entered. Thus commenced two weeks of exhibition, flying demonstration and air display, of which the culmination will be the international display at Antwerp on June 24th and 25th.

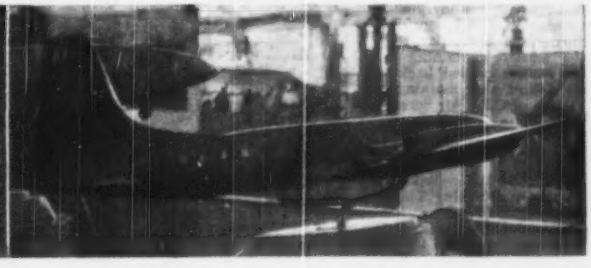
A third of the main floor space in the Salon is devoted to the "fifty years" theme. Seven countries are represented in a commendably comprehensive collection of aircraft and models.

British Participation

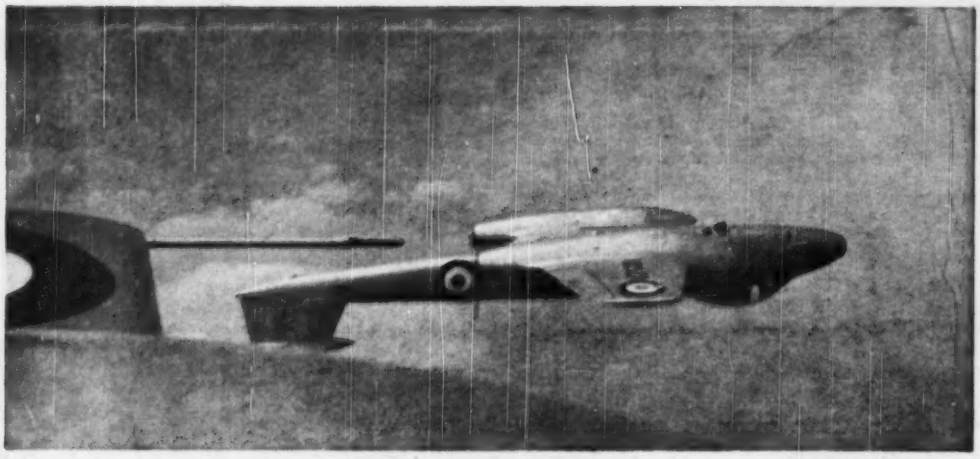
Air Trainers, Ltd.—This Aylesbury firm exhibits a D.4 Link Trainer, for which it holds the exclusive selling rights in all countries outside the British Empire.

Air Service Training.—Activities of A.S.T. are illustrated on the Hawker Siddeley stand.

(*Continued on page 708*)



Seen in model form at Brussels are (below) the Vickers-Supermarine Attacker Trainer and the Proteus-powered Bristol Britannia as ordered for B.O.A.C.



ALL IN THE DAY'S WORK. J. Zurakowski inverted in a Gloster Meteor 8 which is undergoing flight-test observation by Mr. Brian Smith, pilot of the Meteor 7 from which Mr. Russell Adams, of Gloster Aircraft, secured the picture. The projections discernible under the fuselage are chutes to direct the empty shell cases and belt links clear of the belly tank, not fitted on this occasion.

HERE and THERE

Mr. Attlee at Farnborough

THE Prime Minister has accepted an invitation to be guest of honour on the second day (July 8th) of the R.A.F. Display. The King and Queen are to attend on the first day.

Atomic Appointment

MAJ. GEN. LEE, head of the U.S.A.F. Tactical Air Command, has been appointed director of the atomic-weapon test programme at Eniwetok Atoll.

Jet Flight-refuelling

IT is now disclosed that the recent flight-refuelling of a jet fighter, demonstrated at Tarrant Rushton to members of the Air Staff and Ministry of Supply officials, involved the use of a Meteor 4, and not a Vampire as first reported. Like the earlier Meteor 3 tests, also carried out by Flight Refuelling, Ltd., the demonstration was completely successful. A Lancaster acted as tanker.

Hot News

IMMEDIATELY after the conclusion of the Junior T.T. race in the Isle of Man the race-report "copy" and photographic plates for *The Motor Cycle* were flown to Elstree in *Flight*'s Gemini A-TFLT, printed during the night, issues of the journal containing the story were carried back to the Island next morning in a Dove of Olley Air Service, Ltd.

For Bombing Accuracy

THE R.A.F. Laurence Minot Bombing Trophy will this year be awarded after a knockout contest in bombing accuracy. The contest will be staged over three rounds and will be open to all Bomber Command squadrons. In the first round the best squadron at each station will be determined; the second round will decide the best squadron of each group. In the finals (to be held in the autumn) the four best crews of the winning squadron will compete for the trophy. Although Bomber Command is essentially a night-bombing force, the finals will consist of an eight-bomb visual exercise in daylight.

Power Jets Chairman

THE Minister of Supply has appointed Sir William A. Stanier to be chairman of the board of Power Jets (Research and Development), Ltd. He has been a director of this company—which is now Government-sponsored—since 1944. Formerly a celebrated locomotive engineer, Sir William was appointed Scientific Adviser to the Ministry of Production in 1942, and now holds this post in the Ministry of Supply. He is chairman of the Industrial Gas-turbine Committee.

GOOD STAFF WORK: Heading the Central Band of the Women's Royal Air Force, which, as recorded on page 723, is giving an excellent account of itself at the Royal Tournament, is Flt. Sgt. Byram. The bandswomen are wearing their dashing new full-dress uniforms.

Flying Rhinos

AN unusual air-transport operation—the carriage of a load of animals from Khartoum Game Reserve to the Antwerp Zoo—will be featured in No. 301 edition of the film *Pathé*

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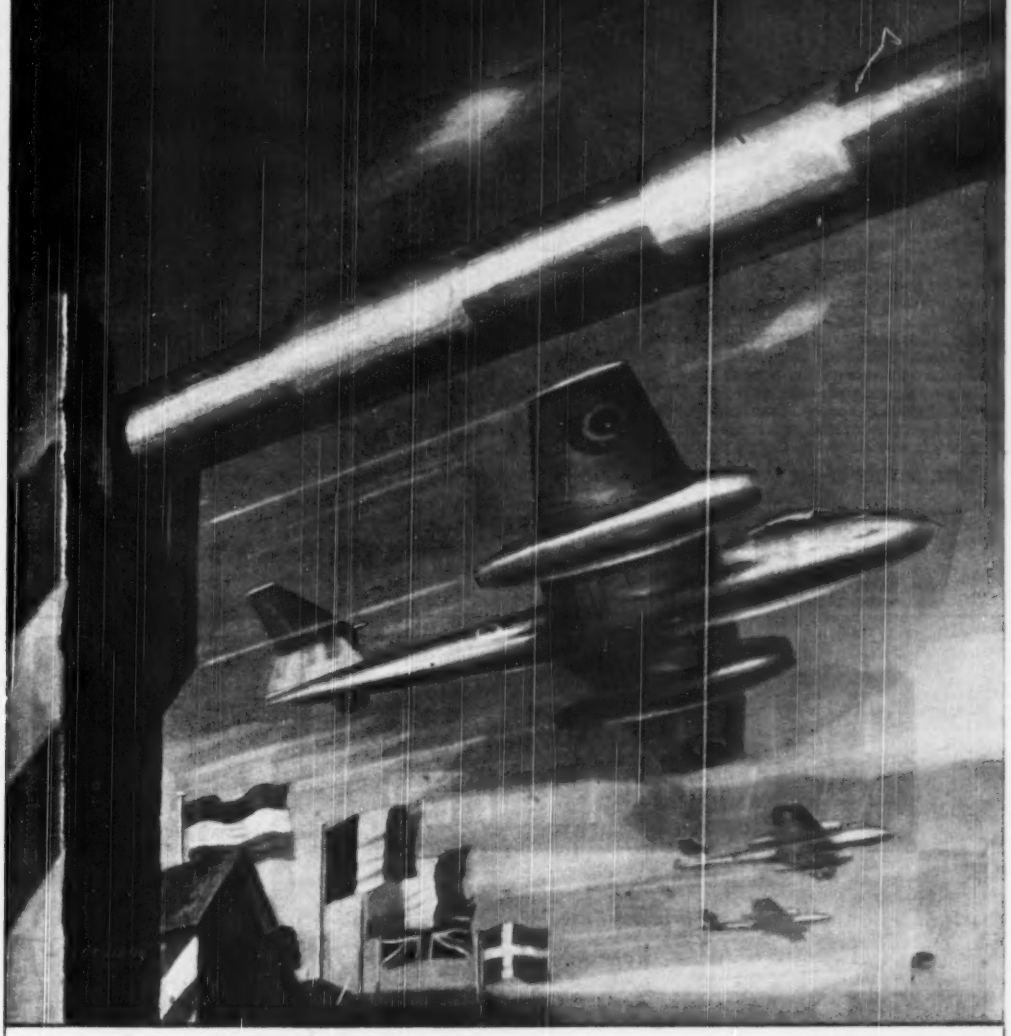

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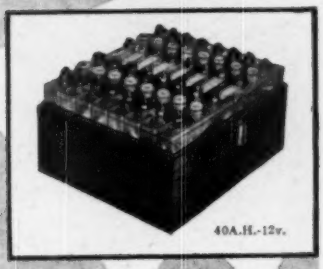

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HERE AND THERE . . .

Pictorial, due for general release next Monday, June 19th. The picture, which is the outcome of co-operation between the film company and Airwork, Ltd., one of whose Vikings made the trip, shows some of the finer points of traffic-handling involved in getting such unusual passengers as white rhinoceroses to travel by air.

Birthday Fly-past

LONDON and the Home Counties last Thursday saw the first of the ceremonial fly-pasts which are to mark occasions of national importance. To celebrate the King's birthday, 18 Lincolns of Bomber Command, from Binbrook and Hemswell, flew over the Metropolis at 1,000ft in six vics in line astern; His Majesty watched them from the Palace balcony.

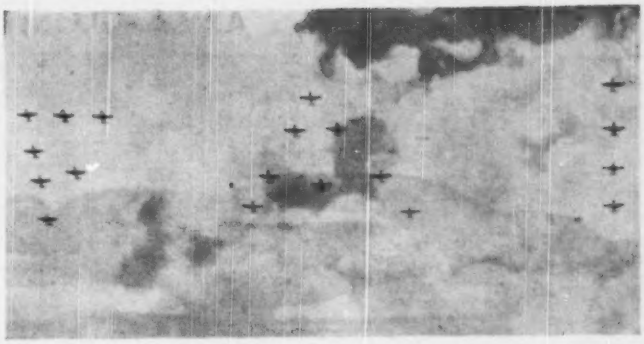
Seen from *Flight*'s offices, overlooking the Thames near Blackfriars, the formation was an impressive one, well maintained in spite of bumpy conditions.

The King's birthday was celebrated throughout the Service, with colour-hoisting parades at home and overseas.

Guard or Grumbler?

THE S.E.2410, a French jet-propelled attack bomber, with two Hispano-Suiza-built Rolls-Royce Nene turbojets, is now flying and has been given the name Grognard, which can either mean a grumbler or a grouser, or a soldier of the Old Guard. In this design, a scale mock-up of which was shown at the last Paris Salon, the Nenes are staggered inside the bulky fuselage. The air intake is let into the upper fuselage surface, and the flush-roofed cockpit is in the extreme nose of the aircraft.

FRAMED in the door of the Vickers-Armstrongs Viscount as it left on June 5th for its tropical tests at Khartoum is Mr. J. Leach (pressurizing and air-conditioning specialist), whose first record has shown the ground temperature at Blackbushe to be 82 deg F in the shade. With him is flight-observer R. Holland. Also on the trip is G. H. F. Hemsley, to whom the R.Ae.S. recently awarded the R. P. Alston Memorial Prize for his valuable work as a flight-test observer.



F.A.I. IN THE SKY: Mustangs of the Royal Swedish Air Force spelt out a welcome to delegates in Stockholm for the Fédération Aéronautique Internationale Congress. This year's Congress also marks the 50th jubilee of the Royal Swedish Aero Club.

Lincolns on Safari

THREE Avro Lincolns from Upwood returned recently to Shallufa, Canal Zone, after visiting R.A.F. Station Heaney, in Rhodesia, where they took part in Empire Day celebrations. Ansons, Harvards, Tiger Moths and the Lancaster squadron from Nairobi performed with the Lincolns before 6,000 spectators.

There has been no change in the position with regard to the withdrawal of overtime working by a section of the printing industry. A slight reduction in the number of pages in *Flight* accordingly continues to be unavoidable.

All journals printed in London are similarly concerned to a greater or lesser extent, but journals printed in the provinces are not affected.

Airborne Television

NEW aerial television-transmitting equipment produced by the Glenn L. Martin Company employs a rotating antenna, in the extreme fuselage tail, to eliminate interference as far as possible. The first aircraft to demonstrate TV transmission from the air, a B-29, was equipped with a large retractable mast beneath the fuselage. Airborne transmission greatly increases coverage.

Eastern Intelligence

ON his return to Washington from the Far East an American diplomat has declared that Russian pilots, using their own jet aircraft, "probably" figure in Peking Government plans for attacking Formosa. In Shanghai, he said, there are more than 3,000 Russian air force and administrative advisers. He recently saw Russian-type jet fighters making flights over the area.

NEWS IN BRIEF

THE Aircraft Golfing Society has arranged for its members to use the facilities of the Nineteenth Club, 10, Old Burlington Street, London, W.1, and an inaugural dinner is to be held on Wednesday, July 5th.

* * *

The London H.Q. of the Department of Scientific and Industrial Research have recently been moved to Charles House, 5-11, Regent Street, London, S.W.1. The telephone number—Whitehall 9788—remains unchanged.

* * *

Dowty Equipment, Ltd., has made an agreement with Rubber and Plastics Inc. of Dayton, Ohio, to manufacture Dowty bonded seals in the U.S.A. These seals consist of a specially shaped rubber washer bonded to a metal ring which forms a leakproof seal when compressed in a joint, and are claimed to withstand pressures up to 10,000 lb/sq in.

* * *

Appearing for the first time since 1939, *The Iron and Steel Directory and Handbook* (price 25s) contains 300 pages of information of value to buyers and users of non-ferrous metals. Aircraft steels are among the materials on which data are given. The publishers of the directory are the Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

Four films in the Shell Film Unit's "Refinery Processes" series have recently been completed under the titles of *Octane Number*, *Cracking*, *Components for Aviation Gasoline*, and *Aviation Gasoline—Blending*.

* * *

The name of Metalastik, Ltd., Leicester, should be added to the list of suppliers of components for the Avro Shackleton, a description of which appeared in *Flight* of May 18th. The firm is responsible for the resilient mountings of the Griffon engines.

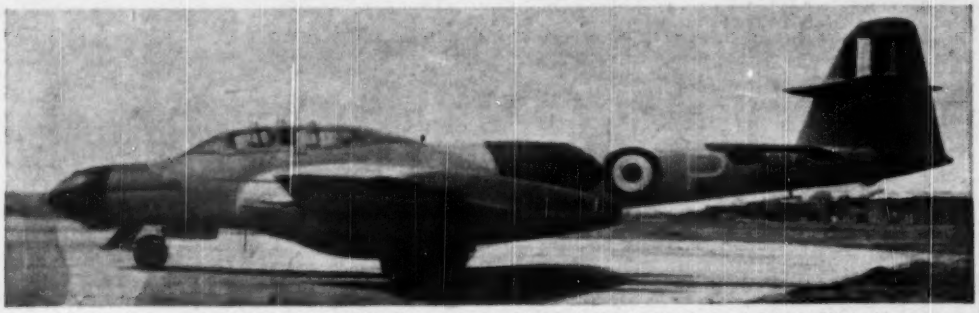
* * *

R. B. Pullin and Co., Ltd., Brentford, Middlesex, announce that their electrical turn-and-slip indicators have been approved for use in the D.H. Comets for B.O.A.C. These instruments, stated to be the only electrical turn-and-slip indicators approved for use in Service aircraft, including jets, have a recommended overhaul period of 1,000 hr.

* * *

In our report (May 18th) of the R.A.F. Display eliminating contests at North Weald, we mentioned some particularly fine Mosquito aerobatics by F/L. G. L. Auty of No. 15 M.U. This unit is, of course, in Maintenance Command, whose pilots do a great deal more flying, and on a larger variety of types, than is generally realized.

JET NIGHT-FIGHTER : A.W.A.-GLOSTER JOINT EFFORT



One of the first views of the Gloster Meteor N.F.11 night fighter, which is to be produced for the R.A.F. by Sir W. G. Armstrong-Whitworth Aircraft, Ltd. (who are also responsible for the redesign work) " in sufficient quantity to re-equip and expand " the present night-fighter force. Although details of the aircraft are restricted, a number of important innovations are observable in the photograph. The extended nose would appear to house A.I. radar, the 20-mm Hispano guns (one of which is visible outboard of the port Derwent turbojet) having been transferred to the wings. Inside the cockpit canopy, resembling that of the Meteor 7 trainer, can be seen ejector seats for pilot and observer; the latter appears to face rearward. The tail unit is of the latest Meteor 8 type and the ventral drop-tank is probably of the usual 180-gall capacity. Performance of the Meteor 11 should correspond closely to that of day fighter versions.

CONTINENTAL WEEK-END (Continued from page 705)

Armstrong Siddeley.—A part-sectioned military-type Mamba turboprop is being covetously eyed by Continental aircraft designers.

Avro.—A model Athena T.2 trainer is Avro's centrepiece.

A. V. Roe Canada, Ltd.—New notes are struck by authentically finished models of the CF-100 all-weather fighter and Jetliner.

Bristol.—Engines shown are the Hercules 763 and Proteus. In model form are the Proteus-powered Britannia, Brabazon II, Type 171 helicopter and Type 170 Freighter. It is learned that the new 170 Mk. 31 military transport has Hercules 738 engines and a dorsal fin.

B.T.H.—Electrical equipment of B.T.H. manufacture for modern airports and aircraft is exemplified, together with radio and radar, on the stand of the Société d'Electricité et de Mécanique, of Brussels.

Bryans Aeroquipment.—Avionics, of Brussels, show a type SMA III pilot-aptitude tester made by this Mitcham company. Instrument-testing equipment is also displayed.

Chance Brothers.—One of the new Chance square-beam airport location beacons is literally and figuratively the centre of interest on the well-stocked stand of Intair.

E. K. Cole.—" Le radar anticollision " of Ekco make is attracting forward-looking enquirers of many nationalities.

Decca.—Intair, of Antwerp, present a 24-volt Decca Navigator.

Dunlop.—The remarkable range of Dunlop wheels, pneumatic and hydro-pneumatic braking systems, flexible pipes, and pneumatic systems for aircraft armament is fully represented. The new Mk. 3 hydraulic brake-actuating control, now first shown, will be used for the Comet's plate-type brakes.

P. Frankenstein and Sons, Ltd.—Shown by this Manchester firm, are new life jackets, with quick inflation by bottle, as approved for use by B.O.A.C., and immersion suits in specially developed Ventile fabric, to the requirements of Naval Aviation.

G.E.C.—Among full-scale examples of G.E.C. electrical equipment for aircraft and airports, a model illustrates the line-and-bar system.

Gloster.—The Belgian Air Force authorized exhibition of a standard Meteor 4 interceptor on the Hawker Siddeley stand in addition to the specimen displayed on its own section. News of the new Meteor 11 night fighter was spreading like wildfire.

Hawker-Siddeley Group.—A family of models includes the Sea Fury, P.1040, Sea Hawk (on this the wings fold by power), and P.1052; arrival of the last-named, in full-scale splendour, is eagerly expected at Melsbroek. Should the all-swept, Tay-powered P.1081 put in an appearance, as is hoped, even the 1052 may be outshone.

High-duty Alloys.—Hiduminium and Magnuminium components are prominent in the " H.D." showcases. They include an air-intake body for the Armstrong Siddeley Adder in Magnuminium 220.

Hordern Richmond.—Aeromatic v.p. airscrews, of this company's make, are presented by Intair.

William Jessop and Sons.—Primarily exhibited are mirror-finish components for well-known gas turbines. There are discs for the Mamba, Python 3, Derwent 5, Proteus, Naiad and Goblin.

K.L.G.—Intair are general agents for K.L.G. plugs, fully represented on their stand.

Marconi.—This organization is represented in Belgium by the Société Belge Radio-electrique of Forest-Brussels, but has its own stand, whereupon its range of radio equipment for aircraft and airports is admirably exemplified.

Plessey International.—Plessey radio equipment on show includes the PT.10, PR.71 and P.TR.01—the last-named being the V.H.F. transmitter/receiver for light aircraft. Among the accessories is the new gas-turbine starter.

R. B. Pullin.—Everyone is intrigued by the model aircraft with Pullin turn-and-slip indicators substituted for its engines. As it banks and yaws, so needles indicate its movements.

R.F.D.—Air rescue and survival equipment of R.F.D. manufacture is represented not only on the company's own stand, but on that of the Belgian Air Force—one of the many user-Services.

Rotol.—Specimen airscrews, and accessory gearboxes for the Meteor, show how Rotol—their Belgian agent is Avionics—are concerned with two systems of aircraft propulsion.

Rumbold.—The spacious stand of Intair embodies a display to show how this Kilburn company provides for the bodily comfort of air travellers.

Short Bros. and Harland.—A special word of congratulation is due to Shorts for their initiative in showing an extremely smart Sealand amphibian (actually the eighth to be completed) in the Salon, and for arranging for a second machine to be flown over.

Skyhi.—Eight models of Skyhi jacks are on Intair's stand.

Slingsby Sailplanes, Ltd.—A standard Slingsby Prefect training glider has a place on the Intair stand, that company holding the agency for civil, military and " performance " gliders in Belgium.

Sperry.—Gyrosyn compasses (the latest C.2A and C.L.2 models) and the Zero Reader (" *l'instrument de vol de l'avenir* ") are represented, in addition to autopilots and other Sperry specialities.

Edward Stanford, Ltd.—Intair display specimens of Stanford's excellent air maps.

Standard Telephones and Cables.—The SR 14/15 instrument-landing system and the D.U.2 airport-type transmitter are major exhibits by Standard Telephones radio division. The STR9X aircraft radio on view is an improved 10-channel version of the STR9.

Vickers-Armstrongs.—The Attacker Trainer, on which design work is in progress, is shown by a model to have tandem ejector seats under a long enclosure and a lengthened fuselage nose. Also publicized for the first time is the V.C3 27-passenger transport, developed from the Viking to meet I.C.A.O. requirements and having a nosewheel undercarriage and crashproof tanks. Models show the Viscount and other current types and there are the well-known seats and accessories.

Walter Kidde.—This company shows a fire tender (on a Commer chassis) and aircraft extinguishers, and publicizes the Kidde-Sun " TN " tender.

Westland.—The red and yellow Westland-Sikorsky S-51 demonstrator goes about its business in front of the Grand Palais du Centenaire. Intair give technical information.

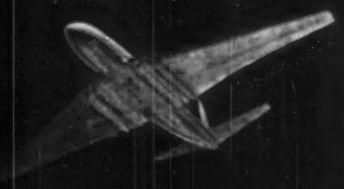
Williamson Manufacturing Co.—The photographic and cartographic devices for which Williamsons have the same reputation on the Continent as at home are set out on the Avionics stand.

Worldmarket, Ltd.—This import and export concern, of 50, Pall Mall, is represented in Belgium by the Antwerp Lion Oil Works, and show flexible couplings, electrical equipment, servo motors, pumps and kindred accessories.

Continental and American Participation

Aircraft shown at the Salon, or at an airfield, are: *Belgium:* SV4B trainer, Avions Fairey Tipsy Belfair V, Tipsy Junior and Tipsy S2 (1935). *Holland:* Fokker S.11 trainer. *U.S.A.:* Lockheed F-80B, Beechcraft Bonanza 35B and Ercoupe. *Italy:* Fiat G.46 trainer, Macchi MB.308 light aircraft, Piaggio amphibian. *France:* Marcel Dassault 315 and Sipa 901 (twin-engined colonial type and trainer respectively), and Fouga Sylphe (formerly Cyclone) jet-propelled light aircraft. *Czechoslovakia:* Aero 45, Zlin 22 and Sokol M1D.

On the F.N. stand is a Rolls-Royce Derwent 8, as now in production at Liége.



GHOST

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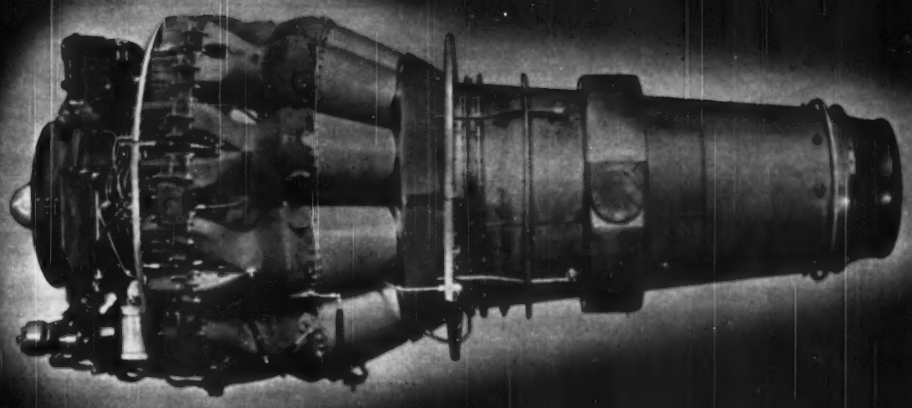

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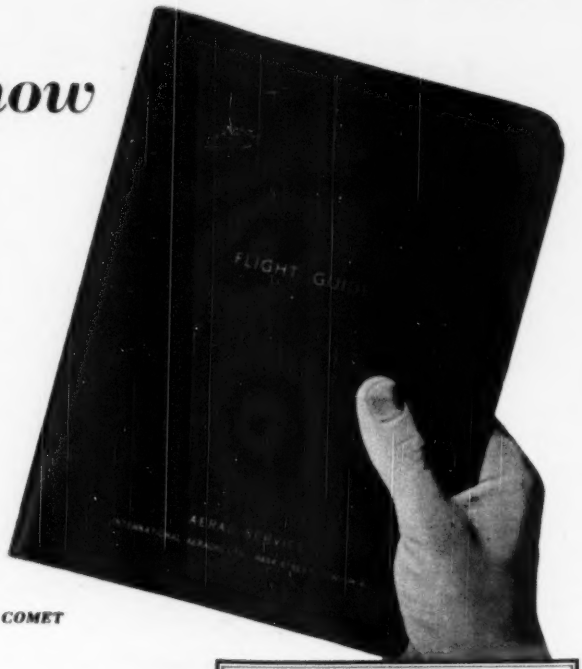

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JET-TRANSPORT CONFERENCE

A Free Exchange of Views and Experience on the Operation of Turbine-powered Aircraft

ASTBURY PARK, New Jersey, was recently the scene of a most revealing discussion upon the nature and operation of jet transports—the occasion, the Jet Symposium in connection with the I.A.T.A. Technical Conference, to which reference was made last week. There was a quite exceptional attendance at this two-day round-table exchange of information, and the participants are listed at the end of the extensive summary which follows. A great many of the divers questions which everyone interested in the operation of gas-turbine-powered transports must have asked himself were answered at this discussion, which was under the chairmanship of Mr. J. T. Dyment, the Director of Engineering of T.C.A. The information is printed in the form of questions and answers, and it is substantially as contained in the unedited I.A.T.A. record. Names of firms or aircraft given in capitals indicate that the answer was given by the appropriate representative from the experience of the firm concerned. A full transcript of the proceedings is to be published by I.A.T.A. Information Services in about six weeks' time.

Meteorology

Is there sufficient data on the variations of wind and temperature with altitude on the world's main air routes to enable accurate evaluation of turbine operations?

Such information is not, over the whole world, available at the present time. There is no certainty yet as to what degree of accuracy is required. The data for the European, North American and North Atlantic areas should be sufficient to provide equivalent headwinds and standard deviations up to 40,000 feet. Networks of stations elsewhere must be extended. I.C.A.O. has already asked improvement in upper air forecasting, in effectiveness, height and economy. I.C.A.O. has also urged all-out effort to establish upper air stations already planned. U.S.A.F. Weather Central in Washington has been plotting winds up to 40,000 feet with a tolerance of plus or minus 20 knots. The situation as regards temperatures is the same: forecasts based on them can be regarded as "a pretty firm factor." A 20-knot headwind tolerance means a 4 per cent difference on fuel consumption and reduces reserves by about eight minutes on a 2,000-mile flight. Variations from standard temperatures at 40,000ft can be as much as 15 deg C. More temperature data are therefore required. COMET trips in Europe and to Africa had good Meteorological information and were able to land within two or three minutes of flight plan. The AVRO JETLINER has had the same experience. Variable routings depending on winds can still be expected at 40,000ft. Wind forecasts will have to be conservative 85 per cent of the time.

What is the degree of accuracy required in forecasts of upper air temperatures *en route*?

The airlines will need forecasts within 5 deg C for temperature and 10 knots for wind velocity. Practical accuracy of present equipment is not sufficient in all cases. At the moment the great need is for a statistical record on which to base analyses of prospective performance. On east-west flights, the accuracy expected is now about 20 knots. Getting greater accuracy will be expensive, but the knowledge is vital to the economics of jet flight.

Can the location of jet streams, clear-air gusts, hail-storms and thunder-storms be predicted, detected and avoided, day and night? And what equipment will be necessary?

A jet stream in the air is a current found at around 35,000ft, and blowing at high speed, similar to the Gulf Stream in the ocean. They are localised, but the density of present observation is not enough to set limits to them: operators may have to "spot" them by in-flight observations of winds encountered *en route*. They are not frequent—it is unlikely that more than one would be found on any given day over the North Atlantic—and they can be avoided by relatively minor detours.

The COMET has encountered only one case of clear-air gusts at high altitude in 250 hours, and found there was sufficient warning to prepare for severe turbulence. The same precautions taken with present aircraft should suffice with jets. Gust strain will largely be absorbed by the aircraft structure and should not cause great passenger discomfort. Strain on a swept-back-wing aircraft would probably be less than on conventional types. BOEING has not encountered any spectacular gusts at high altitudes to date. There are enough data available to-day to build civil jet aircraft capable of coping with gusts. More research into the nature and prediction of gusts will, however, be helpful.

Clear-air gusts are likely to be less significant above 35,000ft than below. I.C.A.O. is now circulating specifications for the kind of meteorological information needed, and has asked for the development of turbulence indicators in aircraft.

Experience of cloud detection radar shows that cloud can be detected and avoided so that thunder and hail areas can be flown around. At jet altitudes, fewer such areas are likely to be encountered. Ground-based radar can also assist in detection.

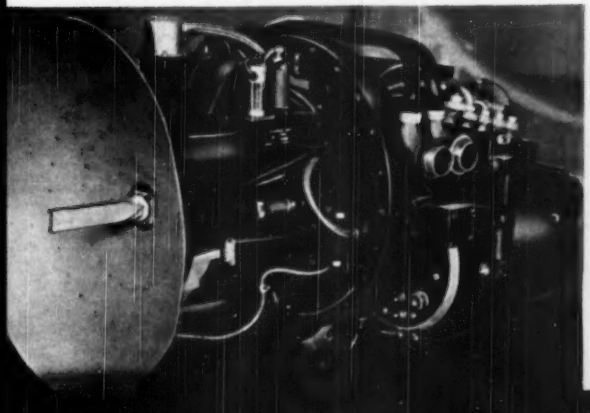
Icing, Hail and Rain

What is the status of protection against icing with centrifugal and axial turbines (including airscrews and spinners)?

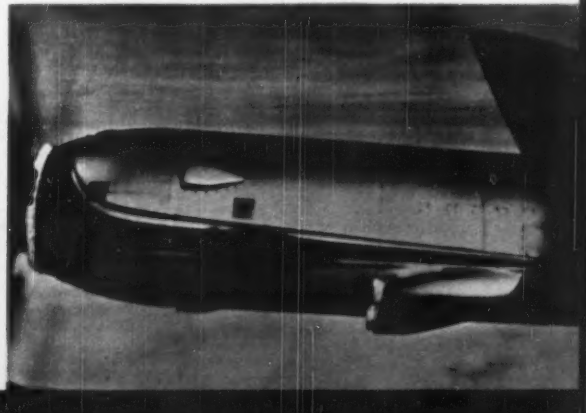
Manufacturers generally reported good experience with de-icing. Protection for centrifugal engines is sufficient now and proper axial flow engine protection should be available in a year's time.

Electrical de-icing on jet aircraft requires more wattage. The jet unit provides more heat—in more convenient form—for hot-air thermal de-icing, but requires more air and thus a greater power and fuel demand. Methanol injection has been used to clear away ice where it cuts down thrust. Such fluid de-icing carries a weight penalty and it would be helpful to know more exactly the duration and severity of icing which can be expected.

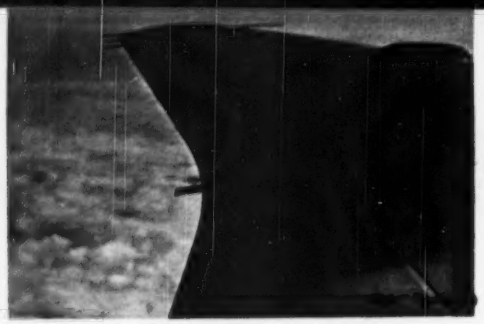
Severe icing can be anticipated during climb and descent, but would be, at jet speeds, of short duration. A jet's most efficient cruising altitude is limited, however, and to vary cruising altitude means either a loss of efficiency or a weight penalty for de-icing measures which would provide continuous protection. The airlines indicated they would prefer to have some de-icing system which would give indefinite pro-



"Cloud radar and turbulence detection might create new requirements peculiar to turbine-driven aircraft."—M.o.S. cloud radar exhibited at the Paris Show, 1949. (*"Flight" Photograph.*)



"Icing protection for centrifugal engines is sufficient now, and proper axial-flow engine protection should be available in a year's time."—Rolls-Royce Dart in the Vickers Viscount.



"Discharge wicks have been fitted to the Comet, but no conclusion as to their effectiveness has as yet been drawn. They should be more effective at lower pressures at high altitudes."

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tection against moderate icing without a weight penalty, but would accept one for additional protection against more severe icing during climb and descent.

What new problems can be anticipated with airframe icing on turbine-driven aircraft?

It was generally felt that airframe icing presented less of a problem than engine icing, and that it is less serious with jet than with conventional aircraft.

Traffic Control and Navigation

What type of let-down procedures will be required, and what will be their influence on air traffic control?

Two landing methods were proposed. AVRO CANADA and BOEING, for reasons of fuel economy, advocated a steep descent at 4,000 ft/min close into the airport, while DE HAVILLAND's preferred to begin let-down at 200 miles out. In any case, no passenger discomfort would result. Both feel that it was necessary to maintain 35 to 50 per cent of engine power in landing, to keep pressurization and generators in operation, and to have power to use in case the aircraft were waved off.

Traffic control considerations are affected by the fact that jets and piston-engined aircraft must, for some time, use the same airports. Jets, for reasons of fuel consumption, must be brought in quickly. The U.S. Air Force has found it advisable to pick up jets by radar quite far out and to guide them in through other traffic. Stacking of other aircraft at various altitude levels constitutes a serious problem without radar, particularly in winter.

It was felt, on the basis of current traffic-control thinking, that jets would need as much as a half-hour's fuel allowance for the possibility of stacking. It might be advisable to hold jets, if necessary, at a point outside the regular stacking areas, although, on short sector flights, the jets might very well be able to stack.

The growing ability of pilots to hold to flight plans through navigation aids, and the lesser time during which jet is exposed to delaying weather *en route*, might reduce the necessity for jet stacking. In heavy traffic areas, it is now often customary to hold up departure until a landing time at destination has been assigned.

Turboprop holding characteristics do not differ greatly from those of conventional aircraft.

A BOEING jet required 17,000 lb of fuel to get the same stacking margin as that given the STRATOCRUISER by a 9,000-lb allowance. The 17,000 lb was slightly more than the payload.

There was some question as to human factors—whether people in conventional aircraft stacked at 3,000ft would happily put up with jets coming in freely from 25,000ft, and whether operators of conventional aircraft would be willing to yield landing priority. It was felt that a substantial part of the time no stacking will occur at most places, and that a reasonable part of the time, stacking is not severe; the probable result might be that during the remaining period, special agreements might be reached at individual airports between the operators concerned.

Is it necessary, for traffic control reasons, to maintain constant *en route* height? And if so, what disadvantages does this have on turbine operations?

This depends on traffic density and the need for arbitrary assignment of traffic levels. In order to maintain a steady speed as fuel is consumed and load grows lighter, jets should maintain constant climb or gain altitude by periodic steps up. To maintain altitude would involve loss of speed or a loss of fuel efficiency. This latter loss would range from 2.5 to 12 per cent, depending on the length of the flight. Much will, of course, depend on the design of the individual plane.

Will turbine aircraft operating at high altitudes be able to use pressure-pattern flying techniques, and are radio altimeters sufficiently accurate for use at heights up to 45,000ft?

Pressure-pattern flying depends on the accuracy of altimeter measurement by radio and pressure altimeters. Radio altimeters are good within 25ft at 40,000ft, and new types are said to be more accurate.

Is it possible to suppress all antennae within the contours of the airframe and obtain satisfactory transmission and reception characteristics, particularly during close-in manœuvring?

The H.F. suppressed antenna has been satisfactory on the COMET. Submerged L.F. antennae are somewhat messy mechanically, but produce good results. Suppressed sense aerials have, in test, given greater sensitivity than normal types. The same applies to V.O.R. and localizer. They must, however, be designed into the airframe and demand special plastic materials, which are not always suitable for use as vital parts of the aircraft or able to withstand the outward push of pressurization. DOUGLAS has not yet been able to find materials satisfactory to the radio people and to themselves at the same time. Suppressed antennae have been built into British jets and have been satisfactory on service test, although the experience has not yet been extensive or exhaustive.

Are there any radio equipment requirements peculiar to turbine-driven aircraft?

Cloud radar and turbulence detection might create new requirements.

Is it expected that static interference will present special problems with high-speed turbine aircraft? And if so, what means will be taken to reduce it to a satisfactory level? Are present-type discharge wicks likely to be effective?

Precipitation static, as a function of speed, is likely to be an increasing problem. A mitigating factor is the tendency to put navigation aids over to V.H.F., where precipitation static is not so bothersome. Ice crystals at operational altitudes should not be serious problems because there is less water in the air than at lower levels.

Discharge wicks have been fitted to the COMET, but no conclusion as to their effectiveness has as yet been drawn, although they should be more effective at the lower pressures of the high altitudes.

Are increased powers likely to be necessary for transmitting at 40,000 feet?

Probably no, except for extremely high frequencies; but even this is doubtful.

Take-off and Landing Performance

Relative to existing aircraft, what is the sensitivity of turbine-driven aircraft to variations in altitude, temperature, humidity, runway slope and wind?

Below full-throttle height, piston has the advantage over turboprop in accommodating to variations in altitude, but this is not particularly significant. There is no reason why turbine take-offs should be differently affected by runway slope or wind. Humidity differences are probably negligible, but the turbine is much more sensitive to temperature. However, water-methanol injection overcomes this latter difference. The future course of temperature effect will depend on the design of the individual power plant. It is probable that the use of water-methanol injection will be restricted to use on hot days to bring the engine power up to normal. In a DERWENT 5, water-methanol injection requires about 10 gal/min, and the injection process does not go on for much longer than that.

To what extent is it anticipated that Jato, afterburning, or water injection will be used?

As a normal procedure, the airlines will not want to use Jato to get them past performance requirements. Afterburning is not applicable to the turboprop and will probably not be used for civil jets.

Are any provisions contemplated to take the place of reverse pitch to decelerate the aircraft on slippery runways or in an emergency?

Reverse pitch is available on turboprops. On turbojets, parachute brakes were advised for emergencies. A 30-foot cargo 'chute has been used in tests and has given most satisfactory results, with even deceleration effective within three seconds. It is possible to decelerate by deflecting thrust, but the necessary mechanism is difficult to install cleanly. The weight of reverse Jato as compared to the parachute brake, is prohibitive. Some form of anti-skid device on

the wheel, perhaps tied in with wing spoilers, would be helpful.

Will design, dimensions and construction of existing runways be suitable for turbine aircraft? Is redesign of runway layout to permit a rolling start practicable and desirable?

With the use of water/methanol injection, runways can probably be kept to present normal lengths. The effect of a rolling start for a jet is not great enough to justify runway redesign. In general, the aircraft can be tailored to fit the airport, although designers feel that the more runway available, the more attractive the aircraft they can produce.

In computing the effect of outside air temperature and humidity for take-off performance, what degree of accuracy is required and at what heights and locations are temperature measurements needed?

Because of the jet's sensitivity to temperature variations, a degree of accurate knowledge will be necessary: what degree, however, is not now known.

Crew Requirements

What crew complement is required to operate a typical four engined turbine aircraft? Are flight engineers necessary?

As with the turboprop, the need for a flight engineer is no greater and no less than in piston-engine aircraft. Viscounts have two-men crews.

The pure jet requires no engineer. The pilot has only one knob per engine, take-off procedures are simple, and fuel regime set before take-off. The Comet and Jetliner have a two-man operating crew.

Are crew qualifications in any way different for high-altitude turbine operation, physiologically or training-wise?

No, as regards both physical qualifications and training. For ground crews working on jets, ear protection is necessary.

Engine Characteristics

Is altitude and/or acceleration blowout of turbine units likely to be an operating problem, and what re-lighting characteristics may be expected?

This should be no serious problem within operating altitudes of commercial aircraft. It is, rather, an engineering design matter. Problems of blowout are under control. Restarting will be no problem at 20,000ft, and aircraft may be brought down to this level. Numerous restarts already have been made down to 15,000ft. There are developments in gas-turbine starters. Electric starters should be satisfactory in commercial aircraft. Cold engine-starting in flight in low temperatures can be accomplished by accelerating. It was also observed that turbine rotors keep windmilling.

What are present specific fuel consumptions with turbine units, and what development may be anticipated? Approximately what are the dates involved?

There is a trend towards definite improvement in rate of fuel consumption in the turbojet. A 3 per cent improvement has been noted during the last three years on certain types of engines. Improvement can be expected in both axial and centrifugal types.

Is it practicable to shut down one or more engines in flight to conserve fuel, and what will be the effect on fuel consumption?

There is no appreciable difference in long-range flight. However, it is definitely worth while to cut out two engines at 5,000ft where stacking problems are encountered.

Are turbine acceleration characteristics such as to impair the aircraft's ability to execute a missed approach procedure? What effect will this have on "critical" (approach) heights?

There seems to be no difference. Acceleration characteristics and critical heights would be unchanged.

What is the variability in power output between engines of the same type as compared with that experienced in reciprocating engines?

Variations in U.S. piston engines are about 2 per cent. With turbines, the variation would be about 3 or 4 per cent, both for axial and centrifugal. Deterioration of power after service is negligible.

Airframe Design and Maintenance

Are such factors as a requirement for aerodynamic cleanliness, new applications of known constructions, rivetless bonding, tapered skins and new types of construction expected to further complicate maintenance of aircraft?

De Havilland has not yet had a spares demand resulting from failure of the bonding (Redux) method of construction. Repair jobs are riveted and no problems at all have developed.

There is much less maintenance trouble in both turbojets and turboprops, because of the absence of vibration. Equipment and instrument life is 30 to 40 per cent longer in both cases.

Are new problems in airframe maintenance likely as a result of more rapid and more extreme changes in operating temperatures and pressures?

In practice, lowest temperatures encountered have been −40 to −50 deg. F at high altitudes, and −60 deg F in test establishments, which are not unusually low.

No special maintenance problems have been met in jets which are not familiar in conventional aircraft.

Are troubles likely to arise from the shorter landing gear on turbojet aircraft, e.g., slush being thrown into intakes by nosewheels?

There has been some trouble with rocks, stones, debris, etc., sucked into the intake. Comet intakes are 7ft 6in above ground and other large models are likely to have equal clearance. The Avro Jetliner, with low undercarriage, has had no slush trouble. Sand has been taken in up to quite high altitudes and engines show signs of its having gone through, but it seems to do no damage.

Is it possible to use air from turbines or other services to pre-rotate landing gear?

The idea is advanced to save wear and tear on rubber tyres. U.S.A.F. and Boeing have experimented on conventional aircraft, but have never found it practical. Pre-rotation flaps on early Constellations were abandoned.

As to the possibility of pre-rotation in turbine aircraft, manufacturers agreed that they were "bleed-happy": they were constantly getting suggestions for use of enough compressed air from turbines to use up their whole output. Air from this source is more expensive than it is worth.

Operational Allowances (Time)

What time-allowances should be assumed in calculating turbine block-to-block times? These will include start and warm-up cockpit check, taxying, take-off, instrument approach, landing, taxying, etc. What does the above mean in terms of fuel allowances by comparison with piston engines?

The purpose of the question is to fix the amount of time margin between starting engines and take-off.

With turboprops, overall experience shows that starting and checks take half the time of the same operations in piston aircraft. Taxying takes the same time.

Three-quarters of the check time for piston aircraft is devoted to other matters than engines. There are also variations as between airports in regard to taxying time. Some of the checking can be, and is done during the taxying period. It would take only a few seconds to check turbine engines. Allowance must also be made for clearance wait. Those now testing jets find towing too slow, but at crowded airports, fuel consumption characteristics might require it. (Idling uses about 50 lb/min.

Port of New York Authority suggests that a taxying parking apron, where aircraft might wait for take-off clearance, must be a feature of future aircraft. The spacing between aircraft lined up for clearance might have to be greater because of jet blast.

Boeing has found that jet tows are complicated, but get

"Reverse pitch is available on turboprops; on turbojets parachute brakes were advised for emergencies. A 30-foot cargo 'chute has been used in tests with most satisfactory results."—Arrester parachute streaming from the tail of a Boeing B-47 bomber.

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the aircraft out to where they can start up without throwing kerosene. Tow-trucks are best when designed for the individual aircraft. Designing one to be used by all types is difficult.

There are differences in starting methods, some starting on the aircraft battery, some using individual electric starting from outside points. An advantage of the tow-truck was the fact that it had normally enough power for starting and for heat and other services on the ground. Trucks might cost as much as $30,000, but they might eliminate much weight otherwise carried on board the aircraft. Starting noises might also make starting remote from apron desirable: fixed power lines at the parking apron to give starting power have been considered as an answer. BOEING and U.S.A.F. agreed that noise was considerable—a scream in front and a roar behind. AVRO and others, however, disagreed. Turboprop manufacturers said their engines were quieter than pistons in starting and running-up.

What flexibility is possible in flight planning and what is the effect on range and payload of the following factors:—
(a) Variation in cruising altitude to avoid storms and rough air?

M.A.T.S. feels that aircraft cruising at 35,000-40,000ft are above most of the rough weather and can readily spot and avoid thunder-heads. Airborne radar is useful in this respect, with an acceptable installation on board weighing about 60 to 100lb.

(b) Variation in cruising altitude to seek optimum wind conditions?

Turboprop and jet consume more fuel in descending, but it was felt that *en route* detours would not involve major problems and that jet aircraft would be more likely to climb back to a higher cruising altitude than go to an alternate at low altitudes. On turboprops, however, it is possible to go to the alternate at lower altitudes by shutting down two of the four engines.

(c) Catering for possibility of engine failure at any point?

The experience gained in full operations will probably make it possible to lower the high fuel reserves which must be allowed when an aircraft is first put into service. Also, it has been found that three-engine operation at altitude is practical.

(d) Ascending or descending through rough air in such a way as to avoid discomfort to passengers or the exceeding of structural limits?

A high wind encountered at 30,000-ft levels frequently prevails at 20,000ft as well. The additional favourable wind necessary to make descent worth while is so great that the advantage gained is negligible. For example, to descend 500ft, a 50-knot gain in favourable wind would be necessary to justify the change. Losing altitude to avoid heavy head winds is not as likely as diverting or climbing. Loss of one or two engines is not very important in jet airliners.

What maximum rate of cabin ascent and descent should be designed for, and what is the maximum tolerable angle of the fuselage to the horizontal during climb and descent?

Jet aircraft do not have to descend at a faster rate than present types. Also, the aerodynamic effect upon passengers of turbulence in a jetliner is negligible. The most desirable rate of change in cabin altitude lies between 200 and 300ft (maximum) per minute for descent and ascent. Mentioned as examples of inside-outside ratios were 2,000ft cabin altitude at 30,000ft; 8,000ft cabin altitude at 40,000ft.

Pressurization failure and sudden depressurization were discussed. It was estimated that a person has one minute of consciousness at 28,000ft, with a rapid decrease in conscious time at higher altitudes, as for example, 28 sec at 35,000ft. U.S.A.F. requires its pilots to use oxygen masks and to fasten seat-belts above certain altitude limits. A balance between window size, weight and safety is necessary. Small, inward-opening doors are desirable. (See also under later heading "Passenger Comfort and Safety.")

The maximum tolerable angle of fuselage to the horizontal in normal quick-descent operations should not exceed 8 deg and should preferably be less. In the COMET the angle varies from plus 6 to minus 4.

Ground Operations

What type of engine starting system is likely to be satisfactory? If electrical, what voltage is required and what action is being taken, or should be taken, to standardize ground equipment?

The type of starter is a matter of choice. Varying voltages are used with electric starters.

Will it be possible to start engines if ground equipment is not available?

Yes. The COMET can obtain two to three starts on its standard battery.

Are special safety precautions necessary during starting?

There are no problems. Seven feet from the intake is considered a safe range.

What special problems are likely to be caused by run-up, test and taxying of jet aircraft? In particular:—
(a) Will it be necessary to take special precautions to avoid the intake of foreign bodies by engines?

Guards are applied to prevent foreign articles being placed and left in intakes.

(b) Will jet fuel and blast cause runway deterioration?

Concrete runways were considered almost essential because of high blast temperatures, and because kerosene dissolves asphalt. BOEING reported that at the runway level 40ft from the jet pipe, the temperature is 200 deg Fahrenheit and the blast 250 ft/sec; 100ft behind, the temperature is 100 deg and the blast 70 ft/sec. Kerosene spillage occurs during initial take-off blast, during deceleration for landing and at engine cut-off.

Operational Allowances (Fuel)

What reserves and allowances are realistic for both long and short range, over land and over water, under present conditions, and what changes can be anticipated (with dates involved) due to forthcoming improvements in navigational aids? Reserves and allowances in this case include fuel for every stage of the operation, including possible fuel lost due to boiling, fuel required as a result of engine failure, fuel required to cover navigational and meteorological uncertainties, etc.

Turbojets and turboprops will require the same comparative extra fuel reserves for thermal de-icing, etc.

Rate of climb—greater in jet aircraft than in piston types—creates a heat and boiling problem. The amount of boiling-away might be as much as 10 per cent in a 1,500-mile leg, depending upon temperature, altitude, etc.

For a considerable time to come, fuel reserves for turbine aircraft will remain proportionately higher than for conventional aircraft.

Can anything be done to lessen the noise of turbine units during ground run-up and taxying?

Aircraft could be placed behind screens. There is some hope that impeller noise will be reduced.

What special facilities should be developed for rapid servicing of turbine aircraft? Will fixed bays be essential? What special equipment will be needed over and above those normally required for reciprocating engines?

Chief problem is refuelling, and under-wing fuelling will be essential. The hydrant system now being developed will be superior to servicing by truck. Manufacturers are working on 200 gal/min procedure. Considerable thought is being given to in-flight refuelling, which can be done.

Turbine units will require much less servicing than do piston engines. Passenger and cargo loading facilities must be improved to reduce ground time—especially by more and bigger doors and easy access to cargo holds. Discussion of inward- or outward-opening doors resulted in examination of advantages and disadvantages of each. Jet aircraft impose no particular problem in ramp handling.

What length of time should be allowed between starting engines and taking-off? And at what points will take-off clearances be obtained and cockpit checks made? What fuel consumption will be involved in this phase by comparison with equivalent piston-engined aircraft?

At uncongested airports, it would be entirely practical to clear turbine aircraft right from the ramp. The high cost of ramp space, however, was cited as a factor in holding

"With water-methanol injection, runways can probably be kept to the present normal lengths. As a normal procedure the airlines will not want to use Jato to get them past performance requirements. Afterburning is not applicable to the turboprop and will probably not be used for civil jets."—D.H. Sprite rocket motor available to assist the take-off of the Comet in adverse conditions.

"It is definitely worth while to cut out two engines at 5,000ft where stacking problems are encountered."—The Vickers Viscount demonstrates its ability to fly with two engines feathered, in this case on one side.

("Flight" Photograph.)

aircraft at the ramp for clearance. It was pointed out that taxy speed of jet aircraft is fast—approximately 30 m.p.h. Thirteen gallons per mile are required for taxying, not allowing for start-ups and slow-downs.

What turn-round time should be allowed in any operational studies on turbine aircraft in view of the special engine characteristics and the quantity of fuel having to be handled?

Turn-round time contingent upon speed of refuelling. In this connection, jets will never stop at a refuelling point without refuelling.

Engine Design and Maintenance

What are the man hours and material costs involved in overhaul and line maintenance of a typical turbine unit as compared with a reciprocating engine?

(In answer to question, attention was called to papers* read at recent S.A.E. meeting.) For new, experimental jet units, considerably lower time and costs were incurred in maintenance. There is less which requires attention. Man-hours and cost on jets are one-half of those required for high-powered piston engines, according to BRISTOL representative. Cost of overhaul also varies according to where work is done—airline or manufacturer—and location.

What are the existing actual service periods between overhauls for jets, and what is anticipated in the future, and at what dates?

ROLLS-ROYCE will give a warranty of 1,500 hours on parts. No difficulty is anticipated in getting 500 hours when aircraft go into airline service, and manufacturers hope to extend that to 800 hours.

What, in general, are the large items of equipment that would be involved in the overhaul and maintenance of turbine aircraft?

Test establishments may have to be adapted to higher noise levels.

What inspection periods may be applicable to turbine engines, and what parts are principally involved?

Replacements involved are listed in S.A.E. *Paper No.* 456.

What total life before retirement is anticipated for turbine engines, and what life is anticipated for components retired at shorter periods?

No definite data on jets. BRISTOL said the longest compressor life is 800-900 hours, and the longest accumulative life on a whole engine 750 hours to date. DE HAVILLAND anticipate 2,000 to 3,000 hours on turbine blades.

Are there airscrew problems peculiar to turboprop installations that are liable to cause trouble (e.g., reliability, large size, balancing, etc.?

The turboprop uses a smaller shaft and blades 50 lb lighter than on corresponding piston engines, because of lack of vibration. There is a limit, however, to how much more can be cut. HAMILTON STANDARD thinks it depends on ability to minimize engine-excited stresses. Higher speed, higher gradient may be problems. Orientation of shaft axis might be changed to mitigate this. Caution was expressed against depending too much on absence of vibration. The need for good dynamic balancing will persist. It will not ordinarily be possible for the operators to do this balancing themselves in the field. Much depends on experience.

How will the failure rate be likely to compare with that achieved on piston engines? How well does the jet maintain its initial power rating and fuel consumption throughout its service life by comparison with piston engines?

British failing rates have been "very gratifying." Initial fuel consumption does deteriorate by about 2 per cent, which is not considered serious.

Has engine and airscrew controllability for turboprop combinations been developed to a point where it is satisfactory for commercial operation?

Yes. Both British and Americans agreed.

What will the power-control system on both turbojets and turboprops be like? Will it be adequate, simple and reliable?

HAMILTON STANDARD is working on electronic development. BRISTOL have short-circuited control problems by separating the turbines which run airscrew and compressor. CURTISS-WRIGHT hope to simplify electronic system substantially, but operators were found to be unwilling to trust too much to electronics, and simple, speed-sensitive types found much favour. They expressed a desire for controls which operate despite failure of auxiliary systems.

What are the advantages and disadvantages of installing power plants in pods as against conventional wing installations, particularly for jet turbines?

BOEING strongly advocated "pods" because they give clean-swept surfaces; simplify maintenance problems and change-over of engine types; isolate engines in the event of fire; give better control of noise level; give aerodynamic "dams" at wing tips to reduce aerodynamic loss. AVRO CANADA said their JETLINER had, in effect, a pod with a very short neck.

Passenger Comfort and Safety

In the event of sudden decompression, what procedures will have to be followed by the crew? Can passengers be protected? Will special provision have to be made to allow very rapid descent of the aircraft to safe altitudes?

No insurmountable problems are anticipated.

What is the risk involved for passengers sitting in the plane of the turbine disc, and how necessary is it to seat passengers clear of the noise cone of the jet exhaust? What c.g. problems will arise from these two conditions?

Present regulations do not prevent seating passengers in the plane of the airscrews, although many passengers prefer to avoid such seats. No reason was adduced to believe that the turbine discs would be more of a problem. The

"Problems of blow-out are under control. Restarting will be no problem at 20,000ft and aircraft may be brought down to this level."—Combustion chamber of the Armstrong Siddeley Mamba turboprop. (This British design is also the subject of a licensing agreement in America).

* *See "Flight," May 4 and 11*

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COMET is not yet soundproofed, so that the full answer to the question of sound is not yet known. In the case of turboprop, noise levels varied at points within the cabin, but are generally better and not more noisy than in conventional types. The COMET has experienced no c.g. troubles in seating of passengers.

Fuel Systems

Will kerosene or gasoline be used generally in commercial turboprop and turbojet transports? What are the major factors for and against either of these fuels?

ESSO favours kerosene for transport use. Kerosene is held to be safer, will give 10 per cent more air miles per gallon and eliminate boiling. Household kerosene has been used by the British and is being pushed by Esso. Kerosene has a higher freezing point (−40 deg C) than gasoline (−60 deg. C), but this is not expected to give any trouble. The opinion was voiced that airlines should specify a high-flash-point fuel which will not explode below 110 deg F, with a low volatility and cheapest cost. Esso said its advocacy of kerosene was based on the fact that it came nearest to these specifications of those fuels readily available throughout the world. SHELL agreed and stressed logistic considerations. BRISTOL said adoption of kerosene is the biggest step towards passenger safety ever taken. Fire danger is less and fire-spread slower than with gasoline. SHELL warned that while kerosene is safer, no one should be lulled into thinking it is entirely safe.

Will it be necessary to make major changes to switch suddenly from the use of kerosene to gasoline?

None at all. BRISTOL have done so without any change whatsoever.

Are present turbine aircraft suitable for operation with ordinary aviation fuels?

Because gasoline is a high-vapour-pressure fuel, pressurized fuel tanks would be necessary to use it in turbines.

What will be the probable price of turbine fuel when produced in quantities of the same order as present high-octane gasoline?

Both SHELL and ESSO said that if airlines can accept D.Eng.R.D. 2482 (U.K. spec), the price will be 5 cents a gallon below the present delivered price of aircraft fuel.

What precautions are necessary to prevent fuel or the contained water in the fuel from freezing, and to avoid wax separation, clogging filters, etc.?

The same precautions now used with gasoline may suffice.

Where will fuel tanks be located? Will cabin tanks be satisfactory from the point of view of safety and freedom from odour in the cabin?

Airlines will not accept tanks anywhere in the fuselage. This was construed roughly to mean no fuel inside the wing-root. Designers thought this arbitrary, but would not recommend bringing it into pressurized areas. No risk is involved in fuel dumping. The COMET has a dump tube located well outboard. The accuracy of present fuel quantity indicating systems might not be great enough for jet operations. It might be supplemented by a totalizing flow indicator.

Costs

What will be the original purchase price per pound of turbine aircraft, including power plants? How will the original purchase price of centrifugal- and axial-compressor engines compare and what will their cost be relative to piston engines? How will the servicing and overhaul costs compare?

Purchase price per pound of turbine aircraft, including power plants, were not available. Comparisons of engine prices were difficult but BRISTOL thought that "we are already in site of parity" for the turboprop as compared with pistons, taking into account the lesser number of man-hours needed in building. If production goes to 1,000 engines, prices could be reduced 20 per cent; much, therefore, depended on quantity.

How will engine, airframe and equipment maintenance costs compare with those of existing transports, and what factors are likely to have important effects?

Routine engine maintenance on COMET is 0.47 man-hours per engine hour and a little over 2s for materials. Airframe maintenance cost is probably of the same order.

What aircraft utilization can be achieved with turbine aircraft and how will flight speed affect this utilization?

A great deal depends on traffic demands: maintenance time is not the only factor. Airlines asserted they would want 14 to 16 hours a day utilization ultimately on short-range U.S. services, have achieved about 8.5 hours a day for the North Atlantic, and somewhat less for short-range European services. Higher speeds on extended routes may cut out night-stops and increase utilization. Generally, utilization is now about 6 to 10 hours per day.

Conversion of Existing Aircraft

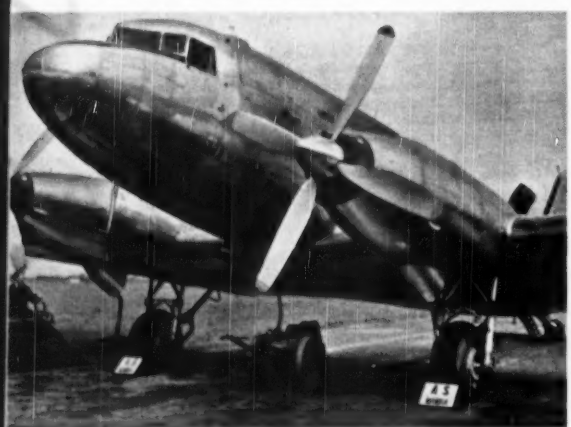
Are the design changes for conversion of current reciprocating engined aircraft minor or major in the case of (a) turboprop and (b) pure jet?

Yes. CONVAIR studies for the CV-240 indicate that: (a) no major modifications are needed to turn over to turboprop, and definite advantages are to be gained. BOEING 377 studies concur, but feel a better aircraft could be built fresh around the engine. VICKERS' experience was that conversions were economically impossible. Not all piston aircraft would be good conversions. Range was not too adversely limited. (b) Conversions from piston to jet were generally held infeasible and uneconomical.

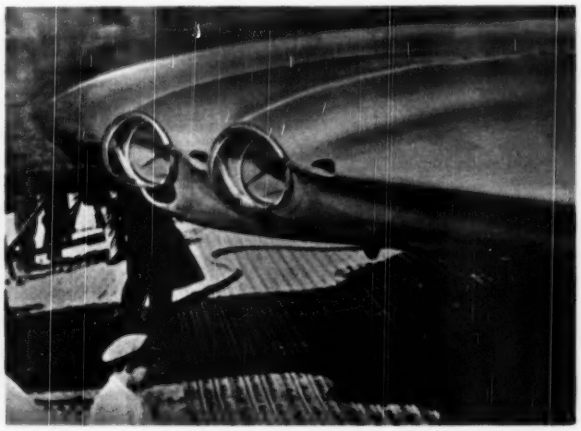
The Participants

Participants in the Symposium included spokesmen for the following manufacturers: Allison Division, General Motors Corporation; Douglas Aircraft Co., Inc.; Boeing Airplane Co.; Bristol Aeroplane Co., Ltd.; Society of British Aircraft Constructors;

"No major modifications are needed to turn over to turboprop, and definite advantages are to be gained."—Dakota conversion with two Armstrong Siddeley Mamba turboprops. (*"Flight" Photograph.*)



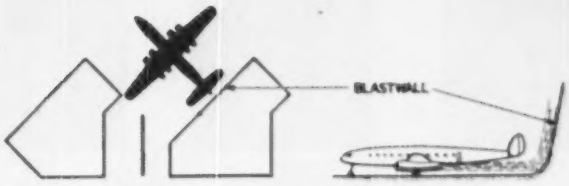
"Guards are placed to prevent foreign articles being deposited and left in intakes. . . . Seven feet from the intake is considered a safe range."—Guards on intakes for Ghosts in Comet.



Canadair, Ltd.; Consolidated Vultee Aircraft Corp.; Curtiss-Wright Corp.; General Electric Co.; Hamilton Standard Division, United Aircraft Corp.; Lockheed Aircraft Corp.; Glenn L. Martin Co.; Pratt and Whitney Aircraft Co.; A. V. Roe Canada, Ltd.; de Havilland Aircraft Co., Ltd.; Vickers-Armstrongs, Ltd.; Wright Aeronautical Corp.; Rolls-Royce, Ltd.; Goodyear Tire and Rubber Co.

Also represented in the discussions were the U.S. Air Force and Military Air Transport Service; the U.S. Civil Aeronautics Administration and Civil Aeronautics Board; the Port of New York Authority; the International Civil Aviation Organization; International Meteorological Organization; Esso; Shell Oil; S.I.T.A. (Societe Internationale des Telecommunications); Aeronautical Radio, Inc., Netherlands Airport Construction Co.; Sperry Instrument Co.; and others. Sir Robert Watson-Watt, of radar fame, also participated.

I.A.T.A. member airlines whose technical personnel participated included Aer Lingus; A.B. Aerotransport (S.A.S.); Air France; Alitalia; American Airlines; American Overseas Airlines; British European Airways; British Overseas Airways Corp.; D.D.L. Danish Airlines (S.A.S.); D.N.L. Norwegian Airlines (S.A.S.); Eastern Airlines; K.L.M. Royal Dutch Airlines; Northwest Airlines; Pan American World Airways; Pan American Grace Airways; S.A.B.E.N.A. Belgian Airlines; South African Airways; Swissair; Trans-Canada Air Lines; Trans-World Airline; and United Air Lines.



"Noise- and blast-walls might be required."—A proposed layout illustrated in connection with London Airport future-development plans (*Flight*, January 12th, 1950).

WHAT'S in a NAME?

Some Thoughts on Aviation Terminology : Associations with the Early Days

By GEOFFREY DORMAN, A.R.Ae.S.

THOUGH the first heavier-than-air flight was made in the United States, a large proportion of the constructional work and flying by which the science progressed from the experimental to the practical state was carried out in France. Thus it happens that a number of words—commonly though now decreasingly—used in aviation are of French origin.

For instance, we have fuselage, empennage, cellule (the wing-structure of a biplane) and aileron (from a bird's pinion-feather); and in the early days we spoke of the undercarriage as the landing-chassis. The term "pitot head" derives from the early Pitot tube, which consisted of a glass U-tube filled with a coloured liquid, usually red and which, as originally applied in aeronautics, was connected to a "static-and-dynamic" head placed in the airflow; the U-tube was calibrated in m.p.h. and comparatively true air-speed was read at the top of the liquid. It was surprisingly accurate and reliable.

The French distinguish between an alighting on land and on water, by speaking of "atterrisage" and "amerisage" respectively. That avoids that contradiction in terms of saying that a flying boat "lands" on water.

When flying began to increase in popularity in Britain a light-hearted group of young men at Brooklands, Hendon and Eastchurch began to evolve a new language of their own—word-mongery which has been developed to this day. The control column—which, no doubt, put new joy into the heart of young aviators by its use or misuse—became the "joystick." The word, however, was (and still is) frowned upon in official circles, the more respectable "control-column" being preferred.

About the time when Brooklands became a flying ground in 1909-10, the latest vehicle to appear on the London streets was the "taximeter motor-cabriolet," at once abbreviated to "taxi." And so, when an aircraft was running along the ground, it was said to be "taxi-ing," now less clumsily spelled "taxying." Running along the ground was also called in those days "rolling." That term was dropped in favour of the more picturesque "taxying" long before the aerobatic kind of "rolling" was thought possible. The word "taxying" was first accepted officially when the War Office used it in announcing the rules for the Military Trials of 1912.

If we may make a dissertation, mention of the Military Trials recalls how "Colonel" S. F. Cody attained military rank. He was a civilian, and an American citizen until he acquired British nationality in 1910. He was engaged by the Army Balloon Factory (ancestor of the R.A.E.) in 1908 to construct an aeroplane for the army. But after many months of experiment he had not achieved more than a small hop, and the "army aeroplane," as it was called, was the butt for jokes on music halls and on comic papers. The fact that the Balloon Factory then dispensed with his services makes the present popularly accepted association between the R.A.E. and "Cody's Tree" at Farnborough seem a little incongruous.

Cody eventually took his machine to Laffan's Plain, housing it in a black wooden shed near where the main Farnborough runway ends, about two miles from the so-called Cody's Tree. After further experiment he achieved success, and was the first man in Britain to fly for an hour—in September, 1909. But the lay Press still called the machine the "Army aeroplane" and its constructor "Colonel" Cody. When the aviator won the Military Trials in 1912, King George V sent a message of congratulation to "Colonel" Cody. Understandably, the recipient said "The King has called me Colonel Cody, so Colonel Cody it is in future." The misuse of the title was due to a mistake by a member of the King's Household; he had been reading the popular Press!

But to revert to terminology, what is now called "turbulence" was (and still is) called remous in France and, in British aviation slang, "bumps." The lay Press originally tried to make readers believe that the cause of a bump (and they thought there were only downward bumps), was that there was a "vacuum" into which an aircraft fell. They christened it an "air pocket." This is one of the hardest-dying fallacies in flying, for quite intelligent people speak to this day of "air pockets," regardless of the fact that nature abhors a vacuum.

Soon after the Frenchman Pégoud first looped, stalled, and even "bunted" on to his back, a reader wrote a letter to the Press and suggested that the term "aerial acrobatics," then used, should be shortened to "aerobatics." The term was immediately adopted everywhere except in official flying-training manuals. The word "bunt," it is said, was invented by Capt. Hubert Broad; the manœuvre has associations with a ditty which was popular in the flying Services in the 1914-18 war, but readers who want further information had better consult the originator!

Because, after Pégoud's first loops, aerobatics were developed fully in Britain, aerobatic manœuvres—"stunts" as they were at first called, rather disparagingly—have British names which have been accepted almost everywhere. Incidentally, I have been puzzled for some time to know why upwards rolls are called "Charlies" in the R.A.F. It has been suggested to me that this might be a belated tribute to the Hon. C. S. Rolls, the first man to fly across the Straits of Dover and back again without alighting, and the first Briton to be killed in an aeroplane accident (at Bournemouth in July, 1910); but in view of the facts that the term only came into use during the last war, and that C. S. Rolls certainly did not perform the manœuvre, this explanation is hardly convincing.

THE KING'S CUP RACE

Details of Next Saturday's Classic Event at Wolverhampton : A Who's Who of the Pilots

NEXT Saturday, June 17th, the nineteenth King's Cup Air Race is to be flown from Wolverhampton Airport, to be followed on Sunday by the Goodyear Trophy Race over a shorter course. In these and following pages will be found information of use to the intending spectator. The contest is being organized for the R.Ae.C. by the Wolverhampton Aero Club, since it is one of the series of National Air Races which this year are being allocated to various clubs. The entry, totalling 42 aircraft, is the largest since 1934, though a few withdrawals have taken place; the list as given below is corrected up to the time of going to press. The number shown before each competitor's name on these two pages, as well as providing a key to the accompanying photograph, is his racing number.

(1) **A. L. COLE** (A. J. Linnell's Comper Swift G-ABUS, Pobjoy R).—At 22, the youngest-but-one pilot in the race, but has had plenty of racing experience in three years. Was third in King's Cup last year and second in 1948 Siddeley Trophy.

(2) **R. E. CLEAR** (Comper Swift G-ACTF, Pobjoy R).—Flies his little single-seat aircraft most week-ends as a busman's holiday from testing Airspeed Ambassadors at Christchurch.

(3) **G/C. A. H. WHEELER, O.B.E.** (Auster Vb G-ALKI, Gipsy Major 1).—A Farnborough pilot, has flown more than 200 types; competed in air races as long ago as 1926; flew a Spitfire in last year's Kemsley Trophy and Air League Cup Races.

(4) **W. H. MOSS** (Mosscraft M.A.2 G-AEST, Pobjoy Niagara III).—At 49, just beats C. A. Neapean Bishop for the honour of being oldest competitor. Is managing director of Chorley, Lancs, aircraft firm bearing his name. Tenth in 1950 King's Cup.

(5) **P. G. LAWRENCE, M.B.E.** (W. H. Moss's Mosscraft M.A.2 G-AFMS, Cirrus Minor I).—A Naval pilot throughout the war, has been chief test pilot to Blackburn Aircraft since 1947. Won last year's Air League Cup in Firebrand 5a.

(6) **MAJ. R. E. YOUNG, D.S.O., D.F.C.** (Miles Hawk Trainer III G-ALIO, Gipsy Major 1).—An officer of the Royal Engineers at Chatham and a keen private pilot.

(7) **J. H. ASHTON** (Hawk Trainer III G-AHNV, Gipsy Major I).—Lives near Stoke-on-Trent.

(8) **C. A. NEPEAN BISHOP** (R. H. Young's Hawk Trainer III G-AIUA, Gipsy Major 1).—An instructor at Redhill, with considerable experience of racing and—at 49 years of age—in aerobatics.

(9) **D. J. JEMMETT** (D. M. Brown's Hawk Trainer III G-ALOG, Gipsy Major 1).—Flew in last year's King's Cup, and a consistent competitor in most races since the war—in which he served as a flying instructor and on transport duties. Lives at Bridgnorth.

(10) **H. A. ROSS** (Hawk Trainer III G-AIYD, Gipsy Major I).—During war service in R.A.F. was engaged on rocket research. Was second in Siddeley Trophy last year. Lives at Godstone, Surrey.

(11) **C. J. de VERE** (Miss M. Wigram's Hawk Trainer III G-AJDR, Gipsy Major 1).—Born in December, 1928, just beats A. L. Cole as youngest competitor. Is a student of College Aeronautical Engineering.

(12) **H. T. RYAN** (Hawk Trainer III G-AHNW, Gipsy Major I).—Learned to fly at Wolverhampton Aero Club, competed in Siddeley Trophy last year.

(13) **H. E. SCROPE** (Hawk Trainer III G-AIUE, Gipsy Major I).—A 27-year-old Londoner.

(14) **E. DAY** (Hawk Trainer III G-AKRV, Gipsy Major I).—As R. A. Walley's entry has been withdrawn. Day's Hawk Trainer becomes back marker among the ten aircraft of this type.

(16) **D. LOWRY** (Chrislea Ace G-AKVS, Cirrus Major III).—As test pilot to the Exeter firm (Mr. Lowry is a consistent demonstrator of its latest products in the light-aircraft field.

(18) **D. G. S. COTTER, M.B.E.** (D. E. Bianchi's Miles Falcon G-ADFH, Gipsy Major I).—A Londoner; served in the A.T.A.

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(19) **E. W. WESTBROOK** (Miles Messenger IVa G-ALBE, Gipsy Major Id).—Lives at Redhill, Surrey.

(20) **W. P. BOWLES** (Miles Messenger Ia G-AKBN, Cirrus Major III).—Flew in King's Cup Race last year and was sixth in Heat 2; has competed in Norton Griffiths Trophy, Isle of Wight Race, and other events. Company director, lives at Denham, Bucks.

(21) **G. C. MARLER** (Miles Messenger III G-AGOY, Cirrus Major III).—A New Zealander who flew in last year's Thruxton Air Races.

(23) **L. S. LOVERIDGE** (E. W. Phillip's Miles Hawk Major G-ACYO, Gipsy Major I).—A fairly consistent competitor in air races, during the past three years. Lives at Wolverhampton.

(24) **D. C. JEMMETT** (Miles Hawk Trainer III G-AKPE, Gipsy Major I).—Like his brother D. J., is a keen racing pilot, though in this case he has learned to fly only since the war.

(25) **MRS. M. M. RENDALL** (E. A. Taylor's de Havilland Rapide G-ALBB, two Gipsy Queen III).—An ex-A.T.A. pilot, Mrs. Rendall —of Island Air Services, Croydon—is racing the largest aircraft.

(26) **R. G. KENT** (Lt. Cdr. J. G. Crammond's Parnall Heck IIc G-AEGI, Gipsy Queen III).—A late nomination to fly this entry (the only Hendy Heck in existence). Mr. Kent is a member of the Private Flying and Air Touring Committee of the R.Ae.C.

(27) **F. DUNKERLEY** (Miles Gemini Ia G-AKKB, two Cirrus Minor II).—Learned to fly in 1947; won last year's Siddeley Trophy and was fourth in King's Cup. Is managing director of a Rochdale mill.

(28) **P. R. L. ROWLEY** (Miles Gemini Ia G-AJWE, two Cirrus Minor II).—A 26-year-old Londoner.

(29) **E. F. WILD** (Miles Gemini Ia G-AKFU, two Cirrus Minor II).—Learned to fly at Midland Aero Club in 1938; lives at Oxley, Staffs.

(30) **LADY SHERBORNE** (Percival Vega Gull G-AFBC, Gipsy Six II).—Is carrying The Hon. Mrs. Falkiner as passenger; lives at Sherborne, Glos.

(31) **DR. D. F. LITTLE** (Percival Vega Gull G-AFEA, Gipsy Six II).—Returning from a Continental tour in time for the Race.

(32) **S/L. W. I. LASHBROOK, D.F.C., A.F.C., D.F.M.** (J. E. Ryland's Percival Proctor I G-AIHD, Gipsy Queen II).—Is chief pilot and operations manager of Lancashire Aircraft Corporation. Joined R.A.F. as an apprentice in 1927. Finished seventh in last year's King's Cup.

(33) **F. WEIR-WILLATS** (Percival Proctor V G-AIET, Gipsy Queen II).—Better known to the non-flying public as dance-band leader Frank Weir. In A.T.A. during war. Fifth in Heat 1 last year.

(34) **D. J. BENNETT** (Percival Proctor V G-AHGR, Gipsy Queen II).—Learned to fly in 1946. Lives at Rotherfield, Sussex.

(35) **S/L. J. RUSH, A.F.C.** (Miles Falcon Six G-AECC, Gipsy Six I).—Learned to fly in 1929; won Manx Air Derby in 1938. Has been a consistent competitor in air races both before and since the war. Fourth in Heat 3 of last year's King's Cup.

(36) **J. N. SOMERS** (Miles Gemini III G-AKDC, two Gipsy Major Ic).—Last year's winner, in the same speedy Gipsy-Major-engined Gemini. Learned to fly at Ford in 1936, and was mainly instructing during his six years' R.A.F. service. Is a London company director.

(37) **C. G. ALINGTON** (Miles Sparrowhawk G-ADNL, Gipsy Major I HC).—Learned to fly at Lympne in 1933, and was a test pilot at the Austin "shadow" factory at Elmdon during the war. Won last year's Isle of Wight Race and was second this year.

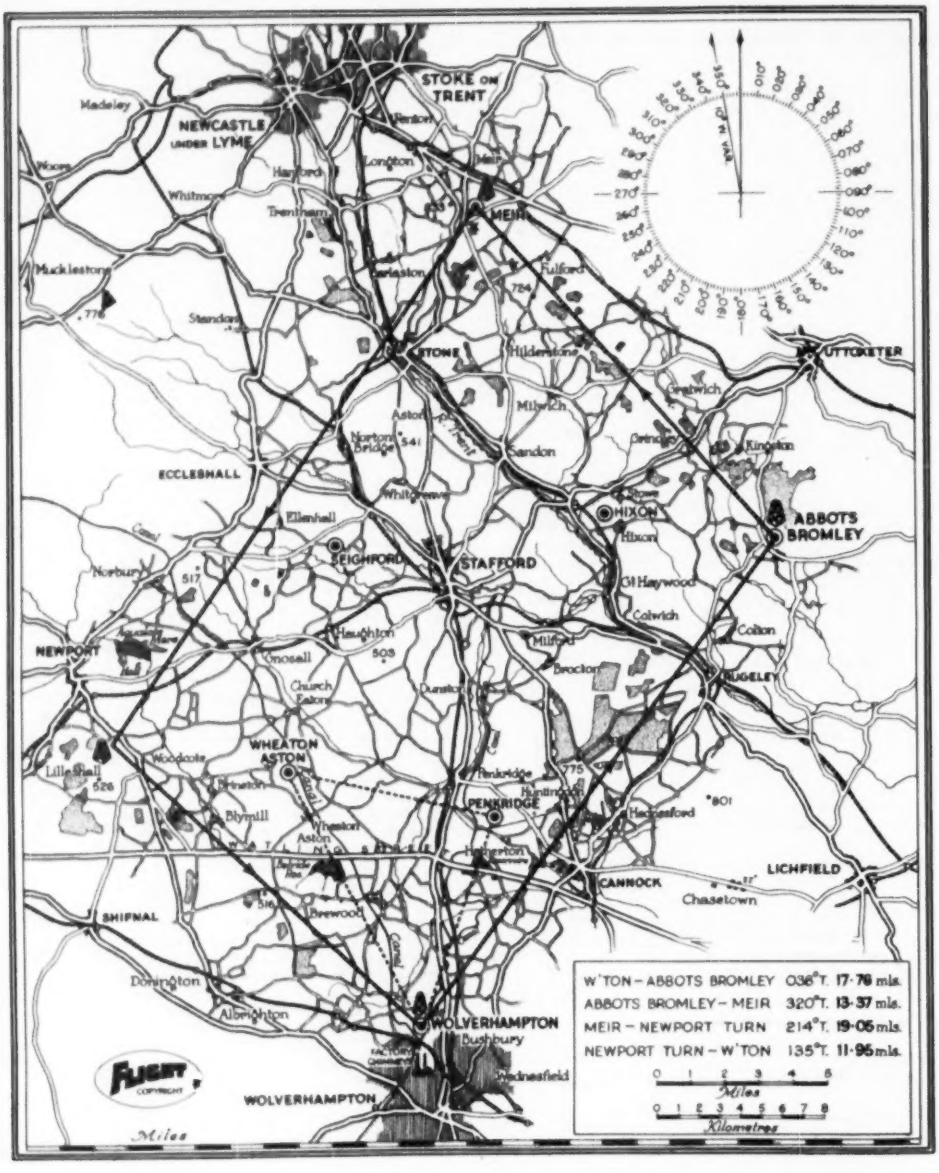
(38) **R. R. PAINE** (Miles Hawk Speed Six G-ADGP, Gipsy Six II).—Was responsible during war for technical maintenance at two Reserve schools. Has flown in every major air race since 1946; won the Southend Trophy Race in 1947 and was second in the King's Cup last year. Is now technical director of Air Schools, Ltd.

(40) **MISS R. M. SHARPE, M.B.E.** (W. S. Shackleton's Spitfire 5b G-AISU, Merlin 55M).—Flying one of three fastest machines in the race, Miss Sharpe is an experienced pilot who safely delivered over 1,000 aircraft during her war service with the A.T.A. Is test and demonstration pilot to W. S. Shackleton, Ltd.

(41) **G/C. PETER TOWNSEND, C.V.O., D.S.O., D.F.C.** (H.R.H. Princess Margaret's Hawker Hurricane 11c PZ 865, Merlin 20).—Flying the Royal entry, G/C. Townsend, 36 years of age, is an experienced fighter pilot, having served during the war with Nos. 1, 36 and 43 Squadrons, and commanded No. 85 Squadron in 1940-41. In last year's race he flew the Princess Margaret's entry (a Miles Whitney Straight) into sixth place.

(42) **P. G. ROBARTS** (Vickers-Supermarine Spitfire Trainer 8 G-AIDN, Merlin 66).—Is a test pilot with Vickers-Armstrongs, Ltd. Lives at Buckingham.

THE KING'S CUP AND GOODYEAR TROPHY CIRCUITS



THE specially drawn *Flight* map reproduced above shows the layout of the King's Cup course in relation to towns, roads and villages in the surrounding countryside, and also indicates some of the features which pilots are likely to use as pinpoints to check their navigation. The short, triangular course, shown as a dotted line, is that which will be used for the Goodyear Trophy Race the following day. The quadrilateral course for Saturday's event measures exactly 100 km (62.13 miles), so that closed-circuit records over this distance may be claimed. It will be lapped three times, anti-clockwise, making the total race distance 300 km (186.39 miles). Competing aircraft will fly at a height of 800ft indicated, and must not descend to below 200ft at the turning-points, which will be marked, in the usual fashion, by pylons. The shorter circuit, for Sunday's event, measures 20 miles, to be lapped three times. A detailed description of the King's Cup course, as it will be seen by the pilots, was written by a member of the staff of *Flight* after he had flown round, and his notes were published in our issue of

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THE KING'S CUP RACE . . .

May 11th. The turning-points at Abbott's Bromley and Meir are at ex-R.A.F. airfields and it is understood that Stoke Corporation is likely to arrange for the public to be admitted to Meir.

The Race—this year, thanks to the longer course, no heats will be flown—will start at 2.30 p.m., and will be preceded by a brief flying display beginning at 1.45; gates open at noon.

Visiting aircraft must land before 1.30 p.m., and will not be allowed to leave before about 5.45 p.m. No landing fees will be charged and air visitors will automatically gain club-enclosure admission. Civil V.H.F. traffic control will be carried out on 118.1 mc/s.

Motorists should arrange for an early arrival. Entry to the members' enclosure will be the main gate in Wobaston Lane and travellers by road are particularly requested to use their car labels, otherwise the police will divert them to the public entrance. Visitors from London are advised to follow A5 as far as Gailey Cross-roads, turn left at this point and right at the first island at Fordhouses; the airport is approximately three-quarters of a mile from the latter point.

The club enclosure will be restricted to members of the Wolverhampton Aero Club and their guests, and to members of the Royal Aero Club; the latter can obtain tickets at 5s, which includes free car parking, from the R.Ae.C. Tickets for the club enclosure are necessary only for R.Ae.C. members.

There will be a public enclosure for which the admission fee will be 3s 6d for adults and 2s for children. (Cars 5s each, buses 30s each.) There will be fully licensed bars in both the club and public enclosures, and luncheon and teas will be served in the club enclosure.

For the Goodyear Trophy Race on Sunday, there are 22 entries; the contest is divided into two heats, the first of which starts at 2 p.m.; the second heat is at approximately 2.50 p.m., and the final at approximately 4.30 p.m. There is no admission charge either for the public or for members, and catering and other facilities will be available as on the previous day.

THE BIRTHDAY HONOURS

A Barony for Rolls-Royce Managing Director

PARTICULARLY well-known members of the aircraft industry figure in the Birthday Honours List, some details of which, in so far as aviation is concerned, appear below.

Mr. E. W. Hives, C. H., M.B.E., F.R.Ae.S., managing director of Rolls-Royce, Ltd., becomes a baron, and his friends in the industry will agree that the honour is well deserved, particularly in view of his immensely valuable work immediately before and during the war, when, as general works manager of the Derby firm, he was responsible for the production of the Merlin and subsequent Rolls-Royce engines which played such a vital part in air victory. Latterly, of course, he has been equally concerned with the success of Rolls-Royce turbojets. Now 64 years of age, he joined the organization as far back as 1908.

Equally worthy of congratulation is Mr. F. T. Hearle, F.R.Ae.S., M.I.P.E., of de Havillands, who receives the C.B.E. Again the year 1908 must be mentioned, for it was then, also, that Mr. Hearle became associated with Sir Geoffrey (then Capt.) de Havilland. In the 1914-18 war he was manager of the experimental department; later he was managing director of the D.H. enterprise through the years of its greatest growth, retiring in 1944 for reasons of health; he remains a director, however.

Two other names well-known in the Industry are those of Mr. H. P. Folland and Mr. J. Martin, both of whom receive the O.B.E. Mr. H. P. Folland, M.B.E., F.R.Ae.S., F.I.Ae.S., F.R.S.A., who is cited in the list as "lately chairman of the Southampton Committee, South Regional Board for Industry," is, of course, managing director of the company bearing his name, while Mr. J. Martin occupies a similar position in the Martin-Baker Aircraft Co., Ltd., of ejector-seat fame.

The services of Capt. J. L. Pritchard, retiring secretary of the R.Ae.S., are recognized by the award of a C.B.E.

BARON

Ernest Walter Hives, managing director, Rolls-Royce, Ltd.

KNIGHTS

H. H. Harley, chairman, Coventry Gauge and Tool Co., Ltd. G. Legh-Jones, a managing director, Shell Transport and Trading Co., Ltd.

Mr. Hives (Baron) and Mr. Hearle (C.B.E.)

ORDER OF THE BATH

Knight Commander (Civil)

Sir Ben Lockspeiser, Secretary, Department of Scientific and Industrial Research.

Companions (Civil)

D. W. Bartington, Under-Secretary, Ministry of Supply; T. R. B. Sanders, assistant controller of supplies, Ministry of Supply.

Knight Commanders (Military)

Air Marshal T. M. Williams; Acting Air Marshal R. M. Foster.

Companions (Military)

A. V-M.s F. M. Baldwin, R.A.A.F., A. P. Ledger, W. J. Seward; Acting A. V-M.s D. F. W. Atcherley; R. L. R. Atcherley; A. Cdre. A. P. Revington; G/C. D. W. F. Bonham-Carter; Principal Chaplain The Rev. A. McHardy.

ORDER OF THE BRITISH EMPIRE

Knight Grand Cross (Military)

Air Chief Marshal the Hon. Sir R. A. Cochrane.

Air Marshal R. M. Foster (K.C.B.) and Mr. James Martin, O.B.E.

Knight Commander (Civil)

E. B. Bowyer, deputy secretary, Ministry of Supply.

Commanders (Civil)

A. J. Amor, principal medical officer, Imperial Chemical Industries, Ltd.; H. R. Chapman, regional controller, London and South-Eastern Region, Ministry of Supply; F. L. Fay, Director of Works, Air Ministry; F. T. Hearle, director, de Havilland Aircraft Co., Ltd.; H. Jones, assistant secretary, Ministry of Civil Aviation; W. L. Owen, Assistant Controller of Production, Ministry of Supply; Capt. J. L. Pritchard, secretary, Royal Aeronautical Society; T. Rowantree, Director of Aeronautical Inspection, Ministry of Supply; C. A. Spencer, deputy chief scientific officer, Department of Scientific and Industrial Research; G. M. Wright, engineer-in-chief, Marconi's Wireless Telegraph Co., Ltd.

Officers (Civil)

P. G. Boxall, Assistant Director of Accounts, Air Ministry; O. Cochran, principal, Ministry of Civil Aviation; Canon W. Cocks, officiating chaplain, R.A.F., Felixstowe; W. W. Davies, senior principal scientific officer, Department of Scientific and Industrial Research; D. C. Espley, senior telecommunications engineer, G.E.C.; H. P. Folland, lately chairman of Southampton Committee, S. Reg. Board for Industry; W. H. Glass, technical director, Thermotank, Ltd.; C. D. James, principal, Department of Scientific and Industrial Research; R. T. Jenkins, technical manager, armament drawing offices, Vickers-Armstrongs, Ltd.; J. Martin, managing director and chief designer, Martin-Baker Aircraft Co., Ltd.; W. G. Pullan, superintending civil engineer, grade II, Air Ministry; E. R. Robinson, Deputy Director of Supply, Ministry of Civil Aviation.

Knight Commanders (Military)

Air Marshal P. C. Livingston; Acting Air Marshal F. J. Fogarty.

Commanders (Military)

A. Cdres. A. Briscoe, L. de Ville Chisman; F. R. W. Scherger, R.A.A.F.; G. Scarrott; G/C.s W. F. Langdon; W. T. Matthews; J. D. Miller; H. A. Murton; T. A. B. Parselle.

Officers (Military)

G/C.s W. K. Beisiegel; J. F. R. Eales-White; W. A. Stagg; Acting G/C.s B. H. Boon; H. H. M. Shurlock; W/C.s S. A. Billman; W. R. Collins; L. M. Crooks; A. B. Greenaway, R.N.Z.A.F.; W. Higgs; L. Mant; A. H. F. Murphy; H. E. Newing; G. C. O'Donnell; C. G. Stowell; D. A. Upton; S/L.s P. J. Ash; C. A. Greenwood, R.A.A.F.; J. W. Taylor; N. Welch; Miss M. I. Lang, Matron-in-Chief, R.A.A.F. Nursing Service, 1940-46.

Further honours will be listed next week.

CIVIL AVIATION NEWS

LANCASHIRE HELIPORT: A B.E.A. S-51 at Speke, northern terminal of the Cardiff-Liverpool service, which started on June 1st.

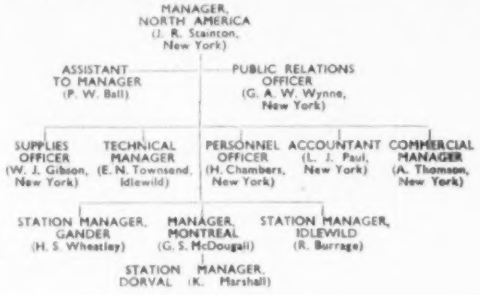
TURNING THE CORNER?

WRITING in the current issue of *B.O.A.C. News Letter* Sir Miles Thomas refers to the drastic "streamlining" of the Corporation's administrative staff which has been effected during the last two months. Some idea of its extent may be obtained from the fact that no fewer than 47 persons receiving salaries ranging from £1,000 to £3,000 a year have left the Corporation's employ. The total of personnel employed today is 17,207 for the merged B.O.A.C. and B.S.A.A., as compared with some 24,464 for B.O.A.C. alone in 1947.

Further proof of B.O.A.C.'s determined effort to improve its financial results is provided by the increase in efficiency which is now apparent. The capacity ton-mileage figure per employee has increased from 3,005 in 1947-48 to 3,796 in 1949-50. The chairman says that although the present increased capacity is in some measure due to new and larger aircraft there was no doubt that the passenger-mileage flown in the last 12 months had shown that considerably more traffic is being handled. He refers in particular to forward bookings on the North Atlantic route where, in spite of keen international competition, traffic has been at least double that of last year.

In spite of this improvement, however, the Corporation's accounts for 1949-50 are likely to show that some serious setbacks were suffered during the year. Keeping open the South American routes with Yorks, following the withdrawal of the B.S.A.A. Tudors, cost £1,750,000, while devaluation added several more hundred thousand pounds to station and operating costs in the hard-currency areas. Training costs for the new fleets are proving high, but that they are justified is shown by the fact that on the Far East route (where Solents were replaced by Argonauts) a deficit of £80,000 per quarter in 1948-49 has been turned into a contribution to overheads of £140,000 for the last quarter of 1949-50. Administrative costs were also reduced from £240,000 in 1948 to £197,000 in 1949, with a far larger carrying-capacity to administer. Sir Miles Thomas also states that mail rates are being reviewed in the light of the larger sums being paid to principal American companies for transatlantic mail.

To the above remarks we may add the observation that, in view of the very substantial dollar bookings which B.O.A.C. is achieving for the North Atlantic route, the efforts of the Corporation's North American personnel are particularly noteworthy. Since March, 1947, this section of the staff has been reduced by 720 to a total of approximately 520. Having to face keen competition, particularly in matters of publicity, and at the same time keeping dollar expenditure down to an absolute minimum is obviously no easy matter, and the Corporation's North American organization (of which some of the senior posts are shown below) is to be congratulated on a very fine effort.


MANAGER, NORTH AMERICA (J. R. Stainton, New York)
ASSISTANT TO MANAGER (P. W. Ball)
PUBLIC RELATIONS OFFICER (G. A. W. Wynne, New York)
SUPPLIES OFFICER (W. J. Gibson, New York)
TECHNICAL MANAGER (E. N. Townsend, Idlewild)
PERSONNEL OFFICER (H. Chambers, New York)
ACCOUNTANT (L. J. Paul, New York)
COMMERCIAL MANAGER (A. Thomson, New York)
STATION MANAGER, GANDER (H. S. Wheatley)
MANAGER, MONTREAL (G. S. McDougall)
STATION MANAGER, IDLEWILD (R. Burrage)
STATION MANAGER, DORVAL (K. Marshall)

HELICOPTER OUTLOOK

PRODUCTION has commenced of a small number of Bristol Type 171 helicopters. Although it is thought unlikely that this type will be used commercially, B.E.A. has ordered one machine for operational trials; the Ministry of Supply will take over several others for tests by the Airborne Forces' Experimental Establishment.

The production variant of the Type 171 (Mark 3) is a four- or five-seat general-purpose machine with a maximum speed of 133 m.p.h. at sea level and 141 m.p.h. at 5,000ft. Service ceiling is 19,000ft and range with normal load 330 miles. The main purpose of the 171 is to carry out experimental work in preparation for the larger twin-rotor Type 173 which the Bristol Aeroplane Company is now developing; this version will accommodate 10 to 12 passengers.

Looking even farther forward, B.E.A. is known to be interested in possibilities of a 30-seater development. One means of avoiding the duplication of rotors which would ordinarily be necessary to lift a helicopter of these dimensions would be to employ blades of unusually large diameter: motivation of such a rotor would present considerable difficulties if driven by the ordinary shaft-and-gear system, and would also require a powerful tail rotor to counteract its torque. These prob-

lems could, however, be avoided by using a rotor driven by tip-jets fed with air supplied by an engine-driven compressor. A system of this type is, in fact, under development in France and is incorporated in the SO 1110 Ariel, of which prototypes have now been flying for over a year.

It does not seem unlikely, therefore, that some application of this same principle may provide the motive power for Britain's future large helicopter transports.

HAPPY DAYS AHEAD

ACCORDING to reports from several international airlines, this summer's transatlantic traffic to Britain will constitute the largest air-tourist invasion ever recorded. Approximately 60,000 people are expected to fly to Europe from the U.S. and Canada during the three months of June, July and August. B.O.A.C. states that, compared with last year, capacity has been doubled for American visitors and is expected to be fully sold. The Corporation will be carrying at least 420 people per week to this country; P.A.A. will carry more than 1,000 people per week to Europe during the three summer months; and A.O.A.'s figure is approximately 800 per week. T.C.A., who introduced a daily transatlantic service on June 1st, are preparing to carry a minimum of 500 passengers a week in both directions.

U.S. AIR-TAXI NETWORK

REPORTS from the United States indicate that the proposed air-taxi network, which will provide integrated services between major terminals and many smaller local landing grounds, is likely to be put into operation on July 1st. By an agreement with the airlines, reached at a recent Air Traffic Conference held at Miami, arrangements are being made for airline traffic personnel to sell tickets which will enable customers wishing to reach points not served by regular airlines to "go all the way by air." Approximately 100 taxi operators are expected to participate in the system by the end of the summer. Some 32 companies have already signed agreements.

Under the National Air-taxi Conference plan, an airline passenger originating his journey at an off-line point will be able to arrange with the local N.A.T.C. member to fly him to the nearest airline stop; on his return journey he can arrange through the airline to have the taxi operator meet him at the end of his scheduled flight. Aircraft used will be such types as Bonanzas, Cessnas, Stinsons and Piper Cubs.

Standard rates are expected to be established and an analysis of the proposed fares has shown that these will average 10 to 12 cents per mile for a two-seat aircraft and 15 to 18 cents for a four-seater. All taxi aircraft will bear the insignia "For Short Hops," represented by a flying-kangaroo emblem.

BY HYTHE TO THE CLYDE

JUNE 1st saw the proving flight of what is to be Britain's first inter-city flying-boat service, when a Hythe of Aquila Airways, Ltd., flew from Southampton to the Albert Dock at Leith (Glasgow). The passengers, among whom was W/C. Barry Aikman, managing director of the company, were officially welcomed by the Lord Provost, Sir Andrew Murray. The Hythe later left for Greenock, where it landed on the Clyde.

At a civic luncheon in Edinburgh, W/C. Aikman referred to the fact that [as reported in *Flight* last week] his company had been refused permission by the M.C.A. to operate the South African Solent service which is due to be given up by B.O.A.C. in October. He said, "We consider this a grave injustice and not in the public interest—we do not intend to let the matter rest there. Aquila Airways are convinced that the flying-boat is the most popular means of travel between Britain and South Africa, and such a service can be operated at a profit."

Meanwhile, the services between Southampton and Scotland will leave for Glasgow on Tuesdays, and for Edinburgh on Fridays, starting on July 4th and 7th respectively. An increase in these frequencies will depend on traffic demand. The fares to be charged (£9 single and £16 4s return) should prove an attraction: they represent a rate which, for the single fare, is slightly cheaper than first-class rail travel with sleeper. The return fare is a little higher than the corresponding railway rate, but, on the other hand, the ticket is valid for six months. Flight time is just over 2 hr in each direction.

BREVITIES

THE Minister of Civil Aviation, Lord Pakenham, visited Germany last week to inspect the routes and establishments operated by B.E.A. He called at Hamburg, Frankfurt, Berlin, Wiesbaden, Bonn and Düsseldorf.

* * *

Approximately 29,700 passengers were carried by P.A.A. Stratocruisers on completion of their first year of transatlantic operation on June 2nd. During that period these aircraft flew some 2,731,000 aircraft miles and crossed the Atlantic 734 times.

* * *

The M.C.A. has appointed Mr. R. A. Maclean to be a member of the Scottish Aerodromes Board in place of the late Sir William Thomson. In addition to being a member of the executive committee of the Scottish Council (Development and Industry), Mr. Maclean is chairman of the Scottish Committee of the Council of Industrial Design.

Eastern Air Lines is reported to have ordered ten Super Constellations. These aircraft, powered by Wright CA-1 engines, will be 18ft longer than present models.

* * *

For the year ended February 28th, Guinea Airways, Ltd., showed a profit of £14,755. The company operates a number of comparatively short routes in South Australia, and has for some time enjoyed passenger load-factors averaging well over 80 per cent.

* * *

On June 3rd the Scottish Advisory Council approved plans for extending the runways at Turnhouse Airport, Edinburgh, on which it is thought that work may begin in October. A scheme for improving the terminal facilities at Renfrew was also earmarked as a priority project.

* * *

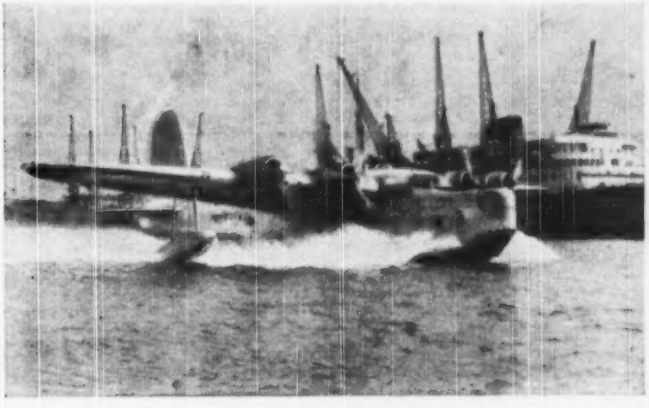
Airwork, Ltd., recently completed the delivery of 38 tons of banknotes and coins for the forthcoming introduction of new currency in the Hashemite Kingdom, Transjordan. Sixteen Viking flights were made on this charter.

* * *

Compactly stowed inside a B.O.A.C. York Freighter a Hiller "Utility" 360 helicopter was recently flown from London Airport to Cairo. The aircraft, which had arrived from New York for onward transmission to an Egyptian firm, had been dismantled and packed in five cases.

* * *

To encourage tourist traffic to Austria, K.L.M. has opened new services from London to Innsbruck and Salzburg; they are flown weekly and will continue until the end of September. An excursion fare (£33 12s) is charged. The flights will be in



THE WATER-WAY TO SCOTLAND: As mentioned on this page, Aquila Airways will begin to operate Hythe services between Southampton, Edinburgh and Glasgow early next month.

CIVIL AVIATION NEWS . .

addition to the normal Vienna service, which is flown twice weekly by K.L.M. in co-operation with Sabena. In addition, K.L.M. is now using Convairliners on its service between Amsterdam and Prestwick; block-to-block times are thus reduced from 3 hr to less than 2¾ hr.

* * *

In offering the concession for running the buffet bar at the Invalides Terminal in Paris to one of France's best-known specialists in food, Air France has established something of a precedent in air terminal catering. Chez François, as the restaurant is now known, is already reported to have become a popular resort for Parisian gastronomes.

* * *

Announcing a 1950 first-quarter net loss of $1,993,681, United Airlines state that this figure shows a recovery in comparison with that for the corresponding period of 1949. Operating revenue totalled $18,366,670 and operating costs rose only two per cent as against a six per cent increase in revenue aircraft-miles flown.

* * *

Mr. George Haldeman, chief of the aircraft division of the C.A.A., recently visited this country to obtain first-hand information on the D.H. Comet. He participated in a special demonstration which was arranged for the U.S. Ambassador to Britain, Mr. Lewis Douglas. With Miss Ruth Elder, the celebrated airwoman of the nineteen-twenties, Mr. Haldeman attempted to fly the Atlantic in 1927; his aircraft was forced down some 260 miles from Europe.

The airport at Gander, which has a reputation for consistently bad weather, recently recorded its 10,000th G.C.A. landing. The equipment (obtained from the U.S. Air Force) was installed by P.A.A. in 1946 and is now used by all the major American and foreign airlines whose services cross the Atlantic. Approximately 50 per cent of all landings at Gander are made under G.C.A. control.

* * *

M.C.A. Information Circular No. 56/1950 contains a warning to aircrews of the unpleasant after-effects which have been noticed following the use of anti-histamine drugs. Operational crews are prohibited from exercising the privileges of their civil licences during such a course of treatment until at least 48 hr have elapsed from the end of the course.

* * *

No fewer than 114 persons were carried on T.W.A.'s recent inaugural Constellation "coach" service. This figure included 32 infants in arms and five crew, and the company believes it to be the largest number ever to be carried on a regular, scheduled service. Seating accommodation is provided for 81 passengers.

* * *

The United States has invited I.C.A.O. to consider ways in which the U.S. "Point Four Programme" on technical aid might be applied to civil aviation. Addressing the I.C.A.O. Fourth Assembly on June 1st, Mr. Russell B. Adams, chairman of the U.S. deputation, asked delegates to reach an agreed international policy on the way in which this assistance might be utilized.

CLUB AND GLIDING NEWS

IN connection with the Cognac International Rally, to be held from July 14th to 16th under the sponsorship of the Bureau National de Cognac, the organizers announce that entries are now approaching the maximum permissible total of 75 and that those who are still contemplating taking part should send in their applications without delay.

The 75 aircraft participating will share 21 cash prizes, totalling over 500,000 francs, and 78 prizes in kind. Entrance fees are from 5,000 francs to 12,000 francs, according to the horsepower of the aircraft.

* * *

DETAILED regulations have now been issued for the National Gliding Contests, to be held at Great Hucklow, Derbyshire, from July 27th-30th. The contests are being organized by the B.G.A. in conjunction with the Derby and Lancashire Gliding Club, which, incidentally, has made very good progress since gliding re-started after the war; the Club also organized the 1949 contest, in which 28 sailplanes competed. Entries, which must reach the B.G.A. by next Saturday, June 17th, are divided into three classes based on aspect ratio. Class 1 will be scratch, Class 2 will receive a 10 per cent bonus of marks earned and Class 3 a 25 per cent bonus. Marks will be awarded to aircraft and not to pilots. No aero-towing will be permitted and launching will be either by winch or bungey. There will be several cups and trophies for the best performances under specified conditions.

The London Gliding Club proposes to enter two teams of three pilots, to fly a Gull IV and a Prefect. The R.A.F. Gliding Association has decided to de-centralize its entries to affiliated clubs, and entries are thus expected from Bomber Command (Olympia), Maintenance Command (Olympia) and Flying Training Command (T-21B). It is also probable that there will be entries from the A.T.C.

VICTOR LUDORUM: This year's Ragosine-Auster Homing Trophy, awarded for the difficult feat of flying a circuit of 111 miles with four turning-points, each to be reached at a given time, was won by Mr. D. R. Woolley of the Blackburn Aircraft (Brough) Flying Club. The trophy—competed for at Rearsby—is thus retained by the Club for the third year.

* * *

THE Wiltshire Flying Club, which operates at Thruxton, reports that flying times between January 1st and May 18th totalled some 512 hours. One of the most popular features this summer is proving to be the week-end "club flights" and it is intended to continue organizing these sorties until there are no more airfields within reasonable distance of Thruxton which have not been visited.

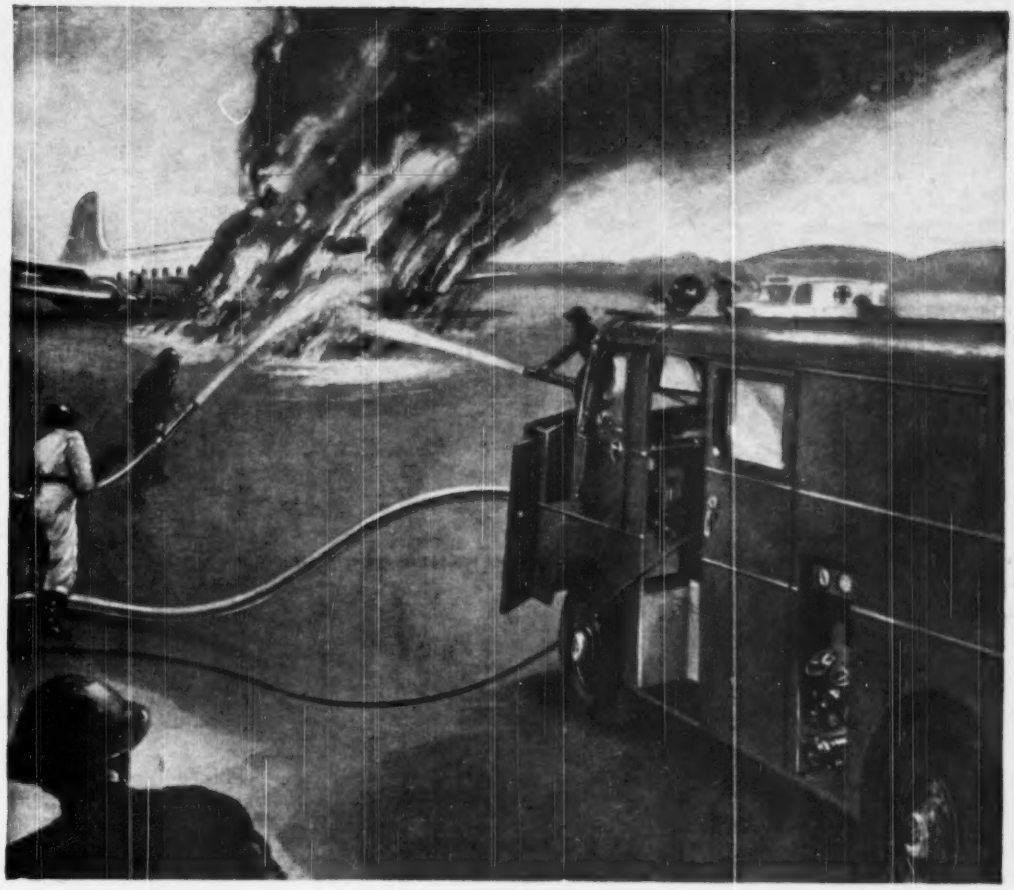
Among the fixtures for the near future are a club flight to Portsmouth on June 25th (for which nine aircraft are available) and the club's "At Home" which is being arranged for July 8th. An informal dance will be held on the same evening.

To meet the increased cost of petrol and higher rentals which are now having to be paid for the base at Thruxton, flying rates have been increased by 5s an hour from June 1st. Thus dual or solo flying is now obtainable on Tiger Moths or Autocrats at £3 5s per hour. On club flights, however, in order to encourage cross-country flying on Tiger Moths these rates are being specially reduced to £2 15s per hour.

* * *

THE varied and entertaining programme arranged by the Ultra Light Aircraft Association for its rally at Fairwood Common, Swansea, on the week-end of June 3rd and 4th was marred by poor weather elsewhere, which prevented many private owners from reaching the airport. Although the thousands of spectators at the airfield itself enjoyed clear blue skies, only one of the 20 light-aircraft pilots expected was able to get through belts of low cloud in other parts of the country: this was B.E.A.'s chief executive, Mr. Peter Masefield, who had flown in a Fairey Junior from Redhill; he reached Swansea only after making a precautionary landing in a field near Basingstoke.

On both Saturday and Sunday afternoons, however, a large crowd witnessed an excellent display which included aerobatics by a Tipsy, bombing competitions, parachute jumps by the Apex Group, a demonstration of the Zaunkoenig, and a fly-past by two Spitfires of 614 Squadron, R.Aux.A.F. An aircraft of particular interest was the pre-war Cierva C.30 Autogiro, which, flown by Mr. G. Baker, gave a convincing demonstration on Saturday afternoon.



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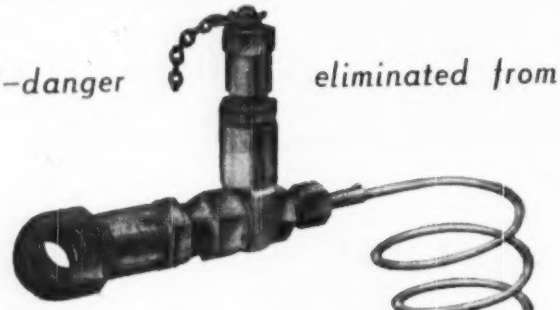

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(Provisional Patent No. 508/49

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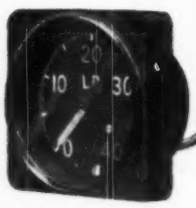

The Barnet Gauge illustrated is the Ministry of Supply Mark XIV. S.A.E. Type Case.

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T.A. 1837

THE MECHANICAL HANDLING EXHIBITION

What the Show at Olympia Has to Offer : Airport and Factory Possibilities

AT Olympia on June 6th, the exhibition organized by our associate journal, *Mechanical Handling*, was opened with an official luncheon, at which the guest of honour was the Rt. Hon. Sir John Anderson, president of the Dock and Harbour Authorities Association, Mr. C. E. Wallis, chairman of the Associated Iliffe Press, was chairman at the luncheon, and among the many distinguished guests were Sir Miles Thomas, chairman of B.O.A.C., and Sir Frank Spencer Spriggs, managing director of the Hawker Siddeley Group.

In his speech of welcome to the guests, Mr. Wallis recalled that at the first Mechanical Handling Exhibition he had expressed the conviction that mechanical handling devices had a very great part to play in raising the efficiency and the productivity of this country. Two years had passed since then, and the necessity for efficiency in production had in no way lessened—in fact, it had increased, because to-day, in all parts of the world, we were going from a sellers' market to a buyers' market, and not only quality but price would be a vital factor in the sale of our products.

The speaker added that this country, with its comparatively limited labour force, could not afford a large percentage of its population to be engaged in the unskilled, uncongenial, and unremunerative tasks of lifting and carrying the goods and materials. The need for improving production efficiency by the adoption of such devices as fork trucks and other mechanical-handling aids was also stressed by Sir John Anderson, in his speech wishing success to the Exhibition.

The exhibition, which remains open until June 17th, comprises displays by over 170 firms, and is the world's largest show of labour-aiding equipment. In conjunction with it is being held a convention, at which papers on a diversity of subjects associated with mechanical handling are presented by many eminent specialists and, too, in the exhibition cinema a variety of apposite films are being shown.

One of the ironies of modern industrialism is that the greater majority of devices invented for the mechanization of labour have been of British origin, and yet to see the most widespread use and further development of such systems, we have to go over to the U.S.A. and Canada. The crux of the matter is that the cost of labour in the U.S.A. and Canada is so high that it is uneconomic to have a man "wasting" his time and energy on doing a job which can be performed more efficiently by mechanical means.

The rising cost of labour in Great Britain, the higher living standard enjoyed, and the shortage of manpower which exists at the present time, are all unmistakable pointers toward the greater use of mechanical-handling equipment over here. It is something which simply has to come, and it would doubtless have come long before this had it not been for an unfortunate diehard attitude on the part of management, and an equally unfortunate shortsightedness on the part of labour. The lesson is, however, slowly being learned, and when a sufficient number of examples have been illustrated to knock the idea firmly into the still recalcitrant heads which exist on both sides, then, perhaps, our production index per manhour may begin to approach that of our Western cousins and, more important, our production costs may start trending downward.

In general, the idea of resorting to mechanical handling in the field of commercial aviation has not been accepted in this country as yet. There are, of course, the fork-lift trucks which, certainly, are to be seen in greatly increasing numbers at the various airports; but there are few other examples of labour mechanization to be observed.

Anyone who visits the Mechanical Handling Exhibition at Olympia can see for himself the very wide variety of British-built mechanical conveyor systems which exist at the present time, and which could very easily be turned to airport use. Baggage transit through customs springs to mind as an immediate application; anything which would facilitate the speeding-up of this dreary procedure between getting off the aircraft and proceeding to one's destination would be a god-send. A conveyor system would also be an extremely useful adjunct to the present system of sorting and handling cargo, particularly as cargo traffic is on the increase. Vertical-lift power trucks have become a virtual "must" for the modern airport, and, in conjunction with these, there would seem to be an excellent opening for the employment of various of the many forms of crate-skips, pallets and stillages displayed at Olympia.

In aircraft and engine factories mechanical handling has been more extensively adopted, especially as a result of the spur of heavy wartime production. Even so, we lag behind the American constructors in this respect, and it is to be hoped that executives who have visited Olympia—or who may do so in the few days remaining—will have been stimulated to consider possibilities for improvement; certainly there is no lack of equipment to meet every need, however specialized.

FIFTIETH ROYAL TOURNAMENT

ON entering Earl's Court the first sign of R.A.F. participation in the 50th Royal Tournament, being presented there twice daily until June 24th, is the smartest Vampire ever seen. A brand new F.B. Mk. 5, it is furbished to perfection and looks for all the world like a scaled-up model.

But the Tournament is traditionally a dynamic rather than a static show, and the R.A.F. and W.R.A.F. on the move in the arena are as impeccably turned out as the Vampire. Even allowing for a certain natural bias on our own part, we unhesitatingly adjudge the display by massed bands of the R.A.F. and W.R.A.F., and the continuation drill by the R.A.F. Regiment, to be one of the neatest, briskest, and (here we have the W.R.A.F. band particularly in mind), most heart-winning turnouts yet seen at a Tournament.

The drill of the R.A.F. Regiment is of "Guards plus" standard, and is the more remarkable for being performed as a continuous series of movements without words of command. The majority of the aircraftmen taking part are National Service entrants, whose average age is 18½ years. Praise for the excellence of this combined event must be apportioned between the Central Band of the Royal Air Force, Regional Bands, the Central Band of the W.R.A.F., the R.A.F. School of Music and the R.A.F. Regiment. It marks the first occasion on which the Regional and W.R.A.F. Central Bands have appeared in their new full-dress uniform, and a brave show they make.

The W.R.A.F. again contribute their quota of grace and beauty to the combined women's Services physical training display, but to what degree, if at all, this Service was responsible for a certain lack of polish evident at the private view on June 6th, we were unable to determine. One must bear in mind, however, that on that occasion the teams had trained together for a fortnight only.

The parachute-training display—progressing to balloons anchored in the roof—by R.A.F. Transport Command provides both spectacle and instruction. Participants include parachute-jumping instructors and other R.A.F. personnel, members of the Paratroop Regiment and supporting units of the Army's airborne forces, and a nursing orderly of the W.R.A.F., representing the R.A.F. medical parachute teams. All deserve the highest praise for their workmanlike exposition of training techniques. This event affords a perfect opportunity for noting how the parachutist is taught to fall with the least shock. A commentator explains how the body is kept semi-relaxed and the fall made in the line of least resistance, using the side of the leg, the thigh, the seat and the rounded back, while the knees, elbows, shoulder and head are prevented from striking the ground. A happy idea was the display of two early designs of parachute, one—represented by a half-scale model—of an 1837 inverted-canopy type.

TURBOJET STRATOCRUISERS?

IT is reported that Pan American World Airways are interested in a proposal to add two turbojets to the Boeing Stratocruiser's power installation. The intention is to attach two "podded" Westinghouse J-34s beneath the wing-tips.

From the British viewpoint, the Stratocruiser already has a very high wing loading, and the addition of two turbojets, plus the necessary provisions for fuel, must make a considerable addition to the weight, which presumably must be compensated by an increased all-up weight rather than by reduction in payload. The proposal cannot, however, be disregarded for P.A.A. believe that performance improvement, particularly climb and range, may be sufficient to enable the Stratocruiser to fly non-stop between New York and London and in the reverse direction, regardless of winds.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Is Any Fuel Safe?

BECAUSE I have heard and read several controversial and occasionally contradictory remarks about the relative merits of kerosene and petrol as fuel for aircraft, I have been trying to find some reliable sources of information, preferably the results carried out with these fuels. There is no trouble, of course, about ascertaining their normal physical properties. The kind of information I have been seeking is the practical type in connection with their behaviour at high altitude and both high and low temperature. What of boiling, and of kerosene's higher freezing point? So far I have not been able to find satisfactory answers.

It is generally conceded that kerosene is a safer fuel for civil aviation, and it seems to have a small economy advantage, but in the event of a crash on take-off, for example, with full tanks in the wings, are the higher flash-point and slower flame spread going to make any real difference? Will a paraffin fire not occur and spread quickly enough to be devastating, even though the initial ignition would take place less suddenly than might be the case with petrol?

These questions are of some interest to all concerned with aircraft and engines—designers, operators and passengers—and will even have a bigger bearing, perhaps, than cost upon the selection of fuel for commercial use, though probably not for military aircraft.

By the way, what do the people who have to handle, transport and store these fuels on the ground think about them?

Brentford, Middx. T. BROWN.

Indian Ocean Route

IN his article "A New Empire Route?" (*Flight*, May 25th), S/L. Martin outlines some of the points in a discussion of the Indian Ocean bases. He does not mention, however, the considerable use made of the more westerly of these bases during the war.

He refers to a training flight in 1946 which did not materialize and to a Sunderland visit to Mahe in 1947; but for three or four years several squadrons of Catalinas and Sunderlands, led by 209 Squadron at Mombasa, pioneered the area, establishing bases at Pamanzi in the Comores; Diego Suarez and Tulear in Madagascar; Mahe in the Seychelles; and Tombeau Bay and Port Louis in Mauritius; apart from the advanced bases established at Addu Atoll and Diego Garcia by Ceylon-based squadrons.

Operating conditions were often difficult owing to the complete lack of permanency about the bases, but hundreds of operational flights were made from these islands with a handful of maintenance personnel and no heavy equipment apart from that obtained locally.

No. 209 Squadron established what became almost a regular ferry service between Mombasa and Ceylon and most of us flew that route with V.I.P.s, usually refuelling at Mahe.

In 1943, B.O.A.C. extended a branch route from Mombasa *via* Pamanzi to Diego Suarez, using R.A.F. facilities, and I carried out a ground survey of the inland lakes and East Coast areas of Madagascar with the object of (i) plotting emergency alighting areas for Catalinas and Sunderlands on patrol in those waters; and (ii) extending the B.O.A.C. service through Madagascar to Mauritius and possibly beyond. The war-time need for this service ceased shortly afterwards and the project was not carried out.

The cost of developing these war-time bases need not be so formidable as S/L. Martin assumes, providing that the obvious supremacy of flying-boats on this type of route is acknowledged. For example, a slipway exists at Mahe and adequate facilities were available at Diego Suarez when 265 Squadron were based there. With regard to the accommodation required at such bases, small prefabricated buildings, and the adaptation of existing buildings (as carried out by the war-time squadrons of the area) should suffice until the routes became commercially successful.

E. P. TAYLOR
London, E.3. (ex-209 Squadron)

Strip-tearing

RE your recent correspondence on "strip-tearing," surely the threat was originally to have a strip of the culprit's hide? I seem to remember a cartoon in an early issue of *Tee Emm* with a wingco holding up a tattered relic and saying "Here's the strip I tore off him."

On the origin of "putting up a black," see P/O. Prune.

Rugby. A. H. ROBSON.

DUNLOP RESEARCH CENTRE

ON June 7th, at Fort Dunlop, Birmingham, Sir Lawrence Bragg, Cavendish Professor of Experimental Physics, University of Cambridge, formally opened the new Dunlop Research Centre. Originally the administration building of the wartime factory at Castle Bromwich occupied by Vickers-Armstrongs, Ltd., the new Centre houses no fewer than fifty beautifully-equipped laboratories; the work of conversion has taken three years. The Research Centre is regarded as the G.H.Q. of the 41 factories comprising the Dunlop world organization, and a description of the laboratories and some of the work engaging attention at the present time will be published in a forthcoming issue.

NATIONAL AIR-RACES NEWS

DETAILS of entries accepted by the Royal Aero Club for three more events in the National Air Races series—spread this year over a number of dates and clubs—were announced last week by the R.Ae.C.

Eleven entries have been accepted for the Air League Challenge Cup Race, which is to be flown from Sherburn-in-Elmet, Leeds, on Saturday, July 22nd. The race is an international handicap open to any type of piston-engined aircraft with a maximum sea-level speed of not less than 150 m.p.h.

Entries from abroad include a little-known make from Norway, the B.H.T.-1 Beauty single-seat monoplane, to be flown by Capt. Jan H. Christie, of Scandinavian Airlines. Italy is represented by Lt. Col. Duilio S. Fanali, the Italian Air Attaché in London, who will fly a Fiat G.46 two-seat trainer.

The race will consist of two laps of a six-sided 100-km course from Sherburn-in-Elmet, the home of the Yorkshire Aeroplane Club. This course will also be used on the same day for the S.B.A.C. Challenge Cup Race, in which, as detailed in *Flight* of June 1st, four jet fighters will compete.

On the following Saturday, July 29th, two more races in the series take place, this time at Woolsington, where they are being organized by the Newcastle-upon-Tyne Aero Club.

The Norton Griffiths Challenge Trophy, an international handicap for aircraft of 1,000-1,750 kg (2,205-3,858 lb) all-up weight, will be flown over five laps of a 20-mile triangular course. For this event the R.Ae.C. has accepted seven entries; Lt. Col. Fanali with the G.46 is the sole foreign entry.

For the second Woolsington event, the international Grosvenor Challenge Trophy (limited to aircraft of up to 1,000 kg) an entry of 24 has been accepted, several of the aircraft being of the true ultra-light category. (The smallest is the Dart Kitten, with twin-cylinder J.A.P. engine, to be flown by C. G. Alington.) The Norwegian B.H.T.-1 already mentioned will be the only entry from abroad, though there is a British entry of a Benez-Mraz Bibi. This race—revived last year after a lapse of 13 years—will be flown over two laps of the 20-mile course; there will be two heats and a final.

"FLIGHT" AND THE R.A.F. DISPLAY

ALREADY there are indications that the revived Royal Air Force Display, to be held at Farnborough on July 7th and 8th, will surpass even the pre-war Hendon events as a brilliant spectacle and a demonstration of flying skill and technical achievement.

FLIGHT has arranged to mark this important occasion by publication, on July 6th, of a special ROYAL AIR FORCE NUMBER. In this greatly enlarged issue, feature articles illustrated in colour and gravure will deal with every noteworthy aspect of Service duties and equipment: the issue will, in fact, form not only a souvenir of the Display, but also a valuable work of reference for all who are interested in the activities of the Royal Air Force.

Although paper restrictions are now less severe, the demand for this number will be heavy, and readers are advised to place orders with their news-agents in order to avoid disappointment.

SERVICE AVIATION

"Flight" photograph.

END OF THE LINE: An Avro York (four Rolls-Royce Merlins) stands easy at Bassingbourn before its next run down to Singapore. Yorks continue to give exemplary service in Transport Command squadrons. They are reliable, liked by crews.

Airmen's Pay and Promotion

SPEAKING at R.A.F. Station, Oakington, on June 6th, Mr. Arthur Henderson, Secretary of State for Air, intimated that better pay and improved opportunities for promotion of airmen are being planned by the Air Ministry's Trades Structure Committee. Mr. Henderson said that he hoped to be able to make an announcement about the scheme before the middle of July. He stated that there would be two ladders of advancement, one for "disciplinarians and leaders of men," the other for "good technicians." Thus, a double opportunity would be afforded for promotion. A new grade of "master technician" would be created.

Extensions for U.S.A.F.

ENGINEERS of the United States Air Force will begin work during the next few weeks on the extension of three R.A.F. airfields for the use of U.S.A.F. bombers. The airfields are Fairford, Gloucestershire, and Upper Heyford and Brize Norton, Oxfordshire. The bases at Marham and Sculthorpe, Norfolk, and Lakenheath, Suffolk, are to be handed back to the R.A.F. for the use of our own B-29 squadrons.

R.A.F. Appointment

THE Air Ministry announces the appointment of A.V-M. George Holroyd Mills, C.B., D.F.C., as head of the United Kingdom Military Delegation to the Western Union Military Staff Committee, with effect from August 8th, in succession to A.V-M. Edmund Cuthbert Hudleston, C.B., C.B.E., who has been appointed Air Officer Commanding, No. 1 Group, Bomber Command, from the same date.

Display Item

NO. 615 (County of Surrey) Squadron, R.Aux.A.F., has been selected to lead the formation fly-past in the R.A.F. Display at Farnborough on July 7th and 8th. S/L. Peter Devitt, who will lead the squadron, has already made a number of flights over the course to be followed, in order to get the timing accurate.

Royal Air Force and Naval Aviation News and Announcements

Joint Services Mission

AIR COMMODORE F. R. D. SWAIN, C.B.E., A.F.C., has joined the British Joint Services Mission, Washington, as Senior Air Staff Officer, Air Force Staff, in succession to Air Commodore H. E. Nowell, C.B., O.B.E.

Until recently Air Commodore Swain commanded No. 28 Group, Technical Training Command, an appointment he took up in February, 1949, on his return from the Middle East, where he was Air Officer in Charge of Administration, first at Air H.Q., East Mediterranean, from January, 1946, and afterwards at H.Q. No. 205 Group, from the end of that year. During the war he held appointments in Bomber Command as Senior Air Staff Officer of No. 6 Group; station commander at R.A.F. Station, Bottesford; commanding officer of No. 19 Operational Training Unit; Senior Administrative Officer, No. 8 Group; and finally as commander of a bomber base.

In 1936, while attached to the experimental section of the Royal Aircraft Establishment, Farnborough, Air Commodore Swain (then a squadron leader) set up an international altitude record by flying at a height of 49,944 feet.

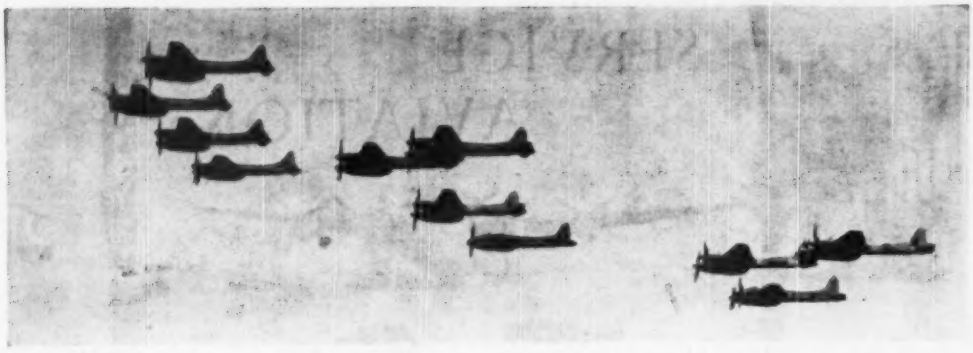
Thunderstorm Flying

WHERE possible, flight through thunderstorms is in future to be part of the training of all R.A.F. pilots. Research by the U.S.A.F. and R.A.F. is showing that, if correct techniques are used, flight through thunderstorms is not hazardous. Although the presence of heavy turbulence, snow and lightning can prove alarming to uninitiated pilots, and hail can cause damage, there is no reason (says the Air Ministry) why military aircraft should not fly through thunderstorms if by not doing so they would prejudice their mission.

The American technique, developed during a scientific project* involving 1,363 traverses through the most active thunderstorms that could be located by radar during two years of investigation, has been confirmed and officially endorsed by the R.A.F. Various pilots of the R.A.E., Farnborough, the Empire Flying School, the All-Weather Training Flight at Singapore, and some of the operational Commands have now collected considerable experience of flight through thunderstorms in many different parts of the world. Generally speaking, the most severe turbulence occurs in a thunderstorm between about 10,000 and 20,000ft and aircraft flying below or above these heights, says the Air Ministry, are not likely to encounter gusts which would impose dangerous structural strains provided the appropriate speed has been maintained. As a thunderstorm is chiefly composed of rising and descending air currents, the main technique of flight in these conditions is to ignore changes in height which may be caused by the vertical airstreams although maintaining a constant level flight attitude.

From an analysis of accidents previously attributed to the violence of turbulence inside thunderstorms, it is now realized that many so-called thunderstorm accidents must have been caused by structural failure which has followed an excessive loading being placed upon an aircraft when recovering from a stall which has itself resulted from flying in the storm at too low an air speed. Taking into account the velocity of the gusts registered in thunderstorms, together with strength factors of the different aircraft in use in the R.A.F., "best turbulent speeds" have now been calculated by aerodynamicists for pilots to maintain when flying through cumulo-nimbus. These give the aircraft the greatest possible safety margin from the point at which a stall would occur, and so from the stage where the risk is greatest of structural overloading of the airframe. These speeds are generally higher than those previously considered suitable; in some cases they are in excess of the normal cruising speeds.

* *See "Flight," January 12th and 26th, 1950.*



OUT TO STING: de Havilland Sea Hornet Naval fighters (two Rolls-Royce Merlins), variously finished in silver and grey, depart to harass the attacking force during the recent Exercise *Activity* in the Bay of Biscay. The aircraft depicted are Sea Hornet F, Mk. 20 single-seaters; also in service is the two-seater N.F.21.

1950 Air Force List

THE 1950 unrestricted edition of the *Air Force List* is now on sale at H.M. Stationery Office, price 15s. This second post-war public edition of the *List* contains considerably more information than the 1949 issue. In addition to the heads of the main branches at the Air Ministry and Command Headquarters, it gives the gradation lists for the Active officers of the R.A.F., the Royal Auxiliary Air Force and the R.A.F.V.R.

R.Aux.A.F. Summer Camps

THIS year, as last, several squadrons of the Royal Auxiliary Air Force will spend their fortnight's annual camp in Germany, at Sylt, the island off the west coast of Schleswig-Holstein, which was the scene of one of the R.A.F.'s earliest attacks in March, 1940, and which is now an armament practice camp.

Squadrons chosen to go to Sylt this year are No. 601 (County of London) and No. 609 (West Riding), from June 17 to July 1; No. 614 (County of Glamorgan), July 9-22; No. 612 (County of Aberdeen), July 15-29; and No. 611 (West Lancashire), July 22-August 5.

Other squadrons will spend their summer camps at R.A.F. Stations, as follows:—R.A.F. Station, Thorney Island: No. 600 (City of London), June 10-24; No. 604 (County of Middlesex), July 8-22; No. 500 (County of Kent), August 12-26. Tangmere: No. 615 (County of Surrey), June 17-July 1; No. 616 (South Yorkshire), August 5-19; No. 501 (County of Gloucester), August 19-September 2. Horsham St. Faith: No. 605 (County of Warwick), June 24-July 8; No. 603 (City of Edinburgh), July 1-15; No. 608 (North Riding), July 8-22; No. 613 (City of Manchester), July 15-29; No. 610 (County of Chester), July 22-August 5; No. 504 (County of Nottingham), August 5-19. Linton-on-Ouse: No. 502 (Ulster), July 15-29. Chivenor: No. 607 (County of Durham), July 8-22; No. 602 (City of Glasgow), July 15-29.

About 3,700 members of the Fighter Control Units will attend summer camps this year. For the first time a number of them will train at Wunstorf, in Germany. No. 3619 (County of Suffolk) F.C.U. completed its summer camp training there in May and other F.C.U.s selected to train at Wunstorf for a fortnight are No. 3509 (County of Stafford), from July 1; No. 3513 (County of Devon-Plymouth), from July 15; No. 3618 (County of Sussex), from August 12; and No. 3512 (County of Devon-Exeter), from Sept. 2.

Other F.C.U.s will do their fortnight's summer camp training at R.A.F. Stations at Manston, Kent; Coltishall, near Norwich; Martlesham Heath, near Ipswich; and Middle Wallop (the Fighter Command Control and Reporting School), near Stockbridge, Hants. Three F.C.U.s are already in camp—No. 3620 (County of Norfolk) at R.A.F. Station, Manston; No. 3510 (County of Inverness) at R.A.F. Station, Coltishall; and No. 3505 (East Riding) at R.A.F. Station, Martlesham Heath, where they assembled on June 3rd. Dates and locations of other camps are as follows:—R.A.F. Station, Manston: No. 3608 (North Riding), from July 1; No. 3602 (City of Glasgow), July 15; No. 3611 (West Lancashire), August 25. Coltishall: No. 3603 (City of Edinburgh), June 24; No. 3613 (City of Manchester), July 8. Martlesham Heath: No. 3505 (East Riding), June 3; No. 3605 (County of Warwick), June 17; No. 3504 (City of Nottingham), July 1; No. 3614 (County of Glamorgan), July 15; No. 3511 (City of Dundee), July 29; No. 3506 (County of Northampton), August 12; No. 3604 (County of Middlesex), August 26. Middle Wallop: No. 3502 (Ulster), July 1; No. 3612 (County of Aberdeen), July 15; No. 3507 (County of Somerset), July 29; No. 3508 (County of Northumberland), August 12; No. 3609 (West Riding), August 26. No. 3617 (County of Hampshire) F.C.U. did its summer camp training at R.A.F. Station, Manston, in April, and No. 3500 (County of Kent) F.C.U. at R.A.F. Station, Martlesham Heath, in May.

ON THE TERRACE: The officers of Nos. 600 and 615 Squadrons, R.Aux.A.F., combined to give a party at Biggin Hill on Saturday evening, June 3rd. The welcome was as warm as the weather and the surroundings, as our picture shows, were altogether charming. "Flight" photograph.

Reunion

NO. 3 (F) Squadron. Proposed reunion of officers to be held in London, October-November (time to be notified later). Past and present officers interested write F/L. D. Chandler, R.A.F. Gutersloh, B.A.O.R. 15.

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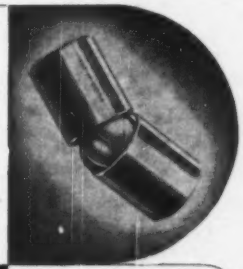

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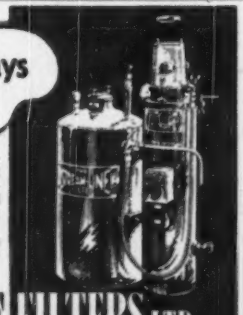

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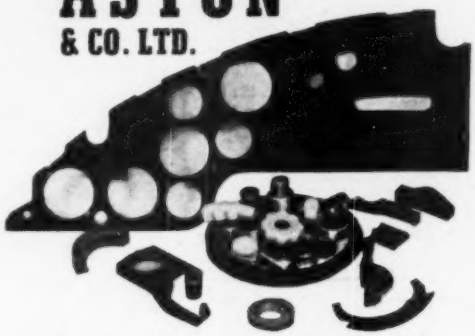

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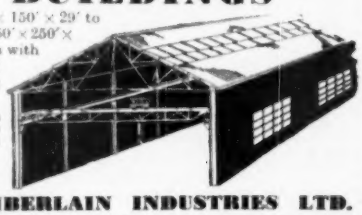

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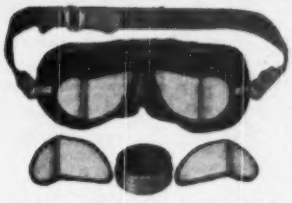

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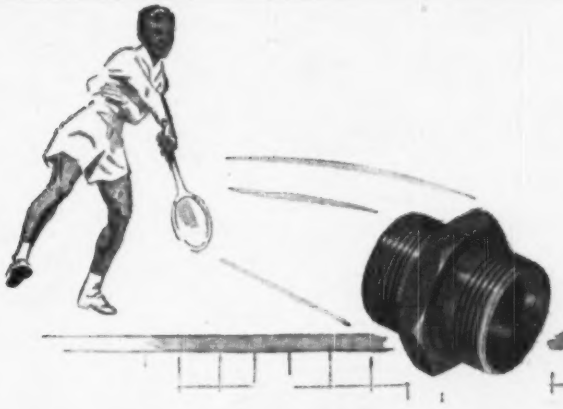

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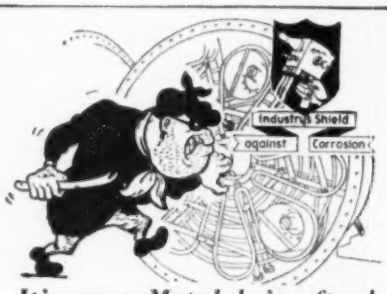

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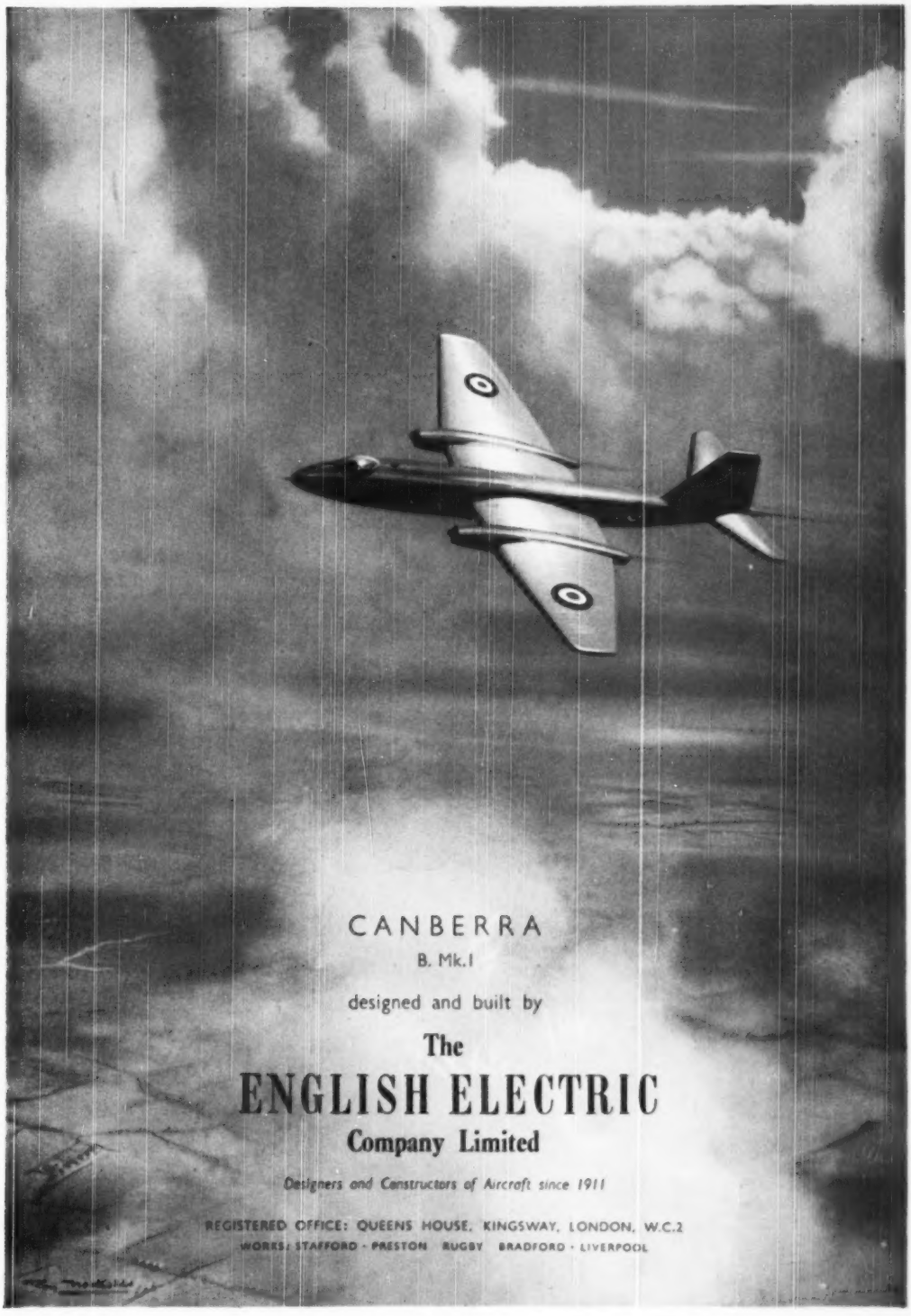
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